

**NASA
Technical
Paper
3060**

May 1991

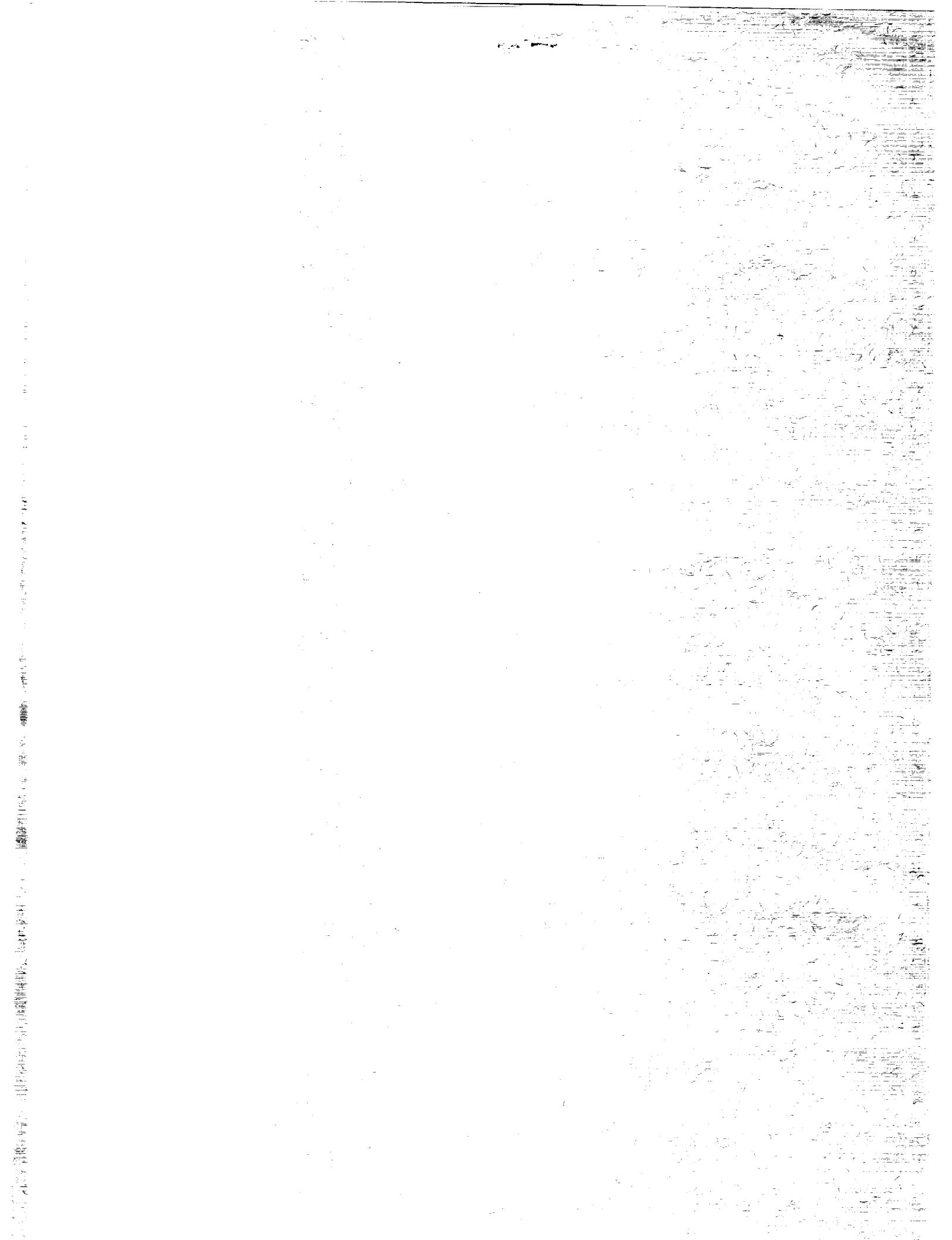
**Aeropropulsive Characteristics
of Canted Twin Pitch-Vectoring
Nozzles at Mach 0.20 to 1.20**

**Francis J. Capone,
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(NASA-TP-3060) AEROPROPULSIVE
CHARACTERISTICS OF CANTED TWIN
PITCH-VECTORING NOZZLES AT MACH 0.20 TO 1.20
CSCL 01A
NASA 257 p

Uncles
H1/02 0309652

NASA



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Summary

The multiaxis thrust-vectoring capability obtained by canting two-dimensional convergent-divergent exhaust nozzles installed on a twin-jet afterbody model has been determined in an investigation conducted in the Langley 16-Foot Transonic Tunnel. Pitch vectoring was accomplished by deflection of the nozzle upper and lower divergent flaps. Several combinations of symmetric and differential pitch-deflection angles were tested at nozzle cant angles of 0° , 30° , and 45° . The effect of varying nozzle divergent flap length was also studied. This investigation was conducted at Mach numbers from 0.20 to 1.20, at angles of attack from 0° to 27.5° , at nozzle pressure ratios up to 8.0, and at sideslip angles of 0° and 5° .

At static conditions, resultant pitch-vector angles were always greater than the geometric angle for symmetrical pitch vectoring. Differential pitch vectoring for the canted nozzle configurations produced resultant yaw angles that were always greater than the geometric angles. Both angles resulted from the overturning of the pitch-vectorized nozzle flow.

The effects of symmetric pitch vectoring on the longitudinal aerodynamic characteristics followed expected trends. The magnitude of both lift and pitching-moment coefficients increased with increasing nozzle pressure ratio and/or nozzle deflection angle. Similar effects were obtained for the lateral aerodynamic characteristics from differential pitch vectoring (yaw vectoring). Symmetric and differential pitch vectoring produced force and moment increments that remained essentially constant over the entire angle-of-attack range for all Mach numbers tested.

Lift and pitching moment decreased with increasing nozzle cant angle for symmetric pitch vectoring. For differential pitch vectoring, side force and yawing moment increased with increasing nozzle cant angle. Afterbody aeropropulsive performance for the unvectored 30° -cant installation was equal to or better than the performance of the 0° -cant installation, regardless of nozzle flap length. This higher performance resulted from the 30° -cant installations having lower aft-end drag at power-on conditions.

The configurations with the long nozzle flaps generally had lower aft-end drag when unvectored, and significantly higher aft-end drag when vectored. The vectored long-flap nozzle configurations had 60 to 85 percent higher jet-induced lift than the configurations with the standard flaps.

Introduction

The mission requirements for the next generation of military aircraft may dictate a highly versatile vehicle that is capable of supersonic cruise, has short take-off and landing characteristics, and can maneuver at high angles of attack. Several studies have shown that significant advantages in air combat are gained with the ability to perform transient maneuvers at high angles of attack, including brief excursions into post-stall conditions. (See refs. 1 to 4.) However, the angle-of-attack envelope of advanced fighters can be limited because of degraded stability characteristics and inadequate aerodynamic control power at high angles of attack. Providing controls that maintain high levels of effectiveness will allow future fighters to exploit a much expanded angle-of-attack envelope.

One promising method of providing large control moments that are independent of angle of attack is vectoring of the exhaust flow. If current control capabilities are sufficient, augmenting existing fighter aircraft control systems could allow the designer the option of reducing empennage size and thus reduce total airframe drag. In either case, improved low-speed, high-angle-of-attack performance and short-field capability are likely benefits of the use of thrust vectoring. (See refs. 5 to 7.)

A number of investigations, conducted at static (wind off) and forward speeds, have verified the effectiveness of multifunction nozzles for pitch thrust vectoring. (See, e.g., refs. 8 to 11.) More recent studies have evaluated static and wind-on effects of lateral or yaw thrust vectoring on installed performance. (See refs. 12 to 16.) In general, multiaxis thrust vectoring for these studies is achieved by providing mechanical devices in both the pitch and yaw planes to vector the exhaust flow. Another way to achieve multiaxis thrust vectoring for a twin-engine aircraft is through an integration concept in which the twin pitch-vectoring exhaust nozzles are canted. Canting the nozzles was accomplished by rotating each of the exhaust nozzles about the respective thrust axis. With the nozzles canted, pitching moment is obtained by symmetric nozzle pitch deflection, whereas yawing moment is produced from differential nozzle pitch deflection. An advantage of this concept is that current full-scale, two-dimensional, convergent-divergent nozzles (ref. 6) can be used without having to modify the nozzle to accommodate additional mechanisms to obtain yaw-vectoring capability.

This paper presents results from an investigation on the effects of nozzle cant angle of two-dimensional, convergent-divergent exhaust nozzles installed on a

twin-jet afterbody model. This investigation was conducted in the Langley 16-Foot Transonic Tunnel at Mach numbers from 0.20 to 1.20, at angles of attack from 0° to 27.5° , at nozzle pressure ratios up to 8.0, and at sideslip angles of 0° and 5° . Several combinations of symmetric and differential nozzle pitch deflections were tested at nozzle cant angles of 0° , 30° , and 45° .

Symbols

All model longitudinal forces and moments are referred to the stability-axis system, and all lateral forces and moments are referred to the body-axis system. The model moment reference center was located at fuselage station 40.78 in. (FS 40.78). A discussion of the data-reduction procedure and definitions of the aerodynamic force and moment terms and the propulsion relationships used herein are presented in reference 17. The symbols used in the computer-generated tables are given in parentheses.

b		reference wing span, 40.00 in.	C_m	(CM)	total aft-end pitching-moment coefficient, including thrust component, $\frac{\text{Pitching moment}}{q_\infty S \bar{c}}$
$C_{D,a}$	(CDA)	aft-end drag coefficient, $C_{D,a} = C_{(D-F)}$ at NPR = 1.0 (jet off)	$C_{m,a}$	(CMA)	aft-end aerodynamic pitching-moment coefficient, $C_{m,a} = C_m$ at NPR = 1.0 (jet off)
$C_{(D-F)}$	(CD-F)	drag-minus-thrust coefficient, $\frac{\text{Drag} - \text{Thrust}}{q_\infty S}$	C_{m_δ}		longitudinal control power, per degree
$C_{F,j}$	(CFJ)	thrust coefficient along body axis, $\frac{F_j}{p_a S}$	$C_{m_{\delta_v}}$		longitudinal control power due to thrust vectoring, per degree
$C_{F,N}$	(CFN)	jet normal-force coefficient, $\frac{F_N}{p_a S}$	C_n	(CN, CYAW)	total aft-end yawing-moment coefficient, including thrust component, $\frac{\text{Yawning moment}}{q_\infty S b}$
$C_{F,S}$	(CFS)	jet side-force coefficient, $\frac{F_S}{p_a S}$	$C_{n,a}$	(CNA)	aft-end aerodynamic yawing-moment coefficient, $C_{n,a} = C_n$ at NPR = 1.0 (jet off)
C_L	(CL)	total aft-end lift coefficient, including thrust component, $\frac{\text{Lift}}{q_\infty S}$	C_{n_δ}		directional control power, per degree
$C_{L,a}$	(CLA)	aft-end aerodynamic lift coefficient, $C_{L,a} = C_L$ at NPR = 1.0 (jet off)	$C_{n_{\delta_v}}$		directional control power due to thrust vectoring, per degree
$C_{L_{\delta_v}}$		lift effectiveness due to thrust vectoring, per degree	C_Y	(CY)	total aft-end side-force coefficient, including thrust component, $\frac{\text{Side force}}{q_\infty S}$
C_l	(CR, CROLL)	total aft-end rolling-moment coefficient, including thrust component, $\frac{\text{Rolling moment}}{q_\infty S b}$	$C_{Y,a}$	(CYA)	aft-end aerodynamic side-force coefficient, $C_{Y,a} = C_Y$ at NPR = 1.0 (jet off)
$C_{l,a}$	(CRA)	aft-end aerodynamic rolling-moment coefficient, $C_{l,a} = C_l$ at NPR = 1.0 (jet off)	$C_{Y_{\delta_v}}$		side-force effectiveness due to thrust vectoring, per degree
			\bar{c}		reference chord, 18.00 in.
			$F - D/F_i$		aeropropulsive parameter
			F_i	(FI)	ideal isentropic gross thrust, $w_p \sqrt{\frac{RT_{t,i}}{g^2} \left(\frac{2\gamma}{\gamma-1}\right) \left[1 - \left(\frac{1}{\text{NPR}}\right)^{(\gamma-1)/\gamma}\right]}$, lbf
			F_j	(FJ)	measured thrust along body axis, lbf
			F_N		measured jet normal force, lbf
			F_r	(FR)	resultant gross thrust, $\sqrt{F_j^2 + F_N^2 + F_S^2}$, lbf
			F_S		measured jet side force, lbf
			g		gravitational constant, 32.174 ft/sec ²

<i>M</i>	(MACH)	free-stream Mach number
NPR	(NPR)	nozzle pressure ratio, $p_{t,j}/p_a$ or $p_{t,j}/p_\infty$
<i>p_a</i>		ambient pressure, psi
<i>p_{t,j}</i>		average jet total pressure, psi
<i>p_{\infty}</i>		free-stream static pressure, psi
<i>q_{\infty}</i>		free-stream dynamic pressure, psi
<i>R</i>		gas constant, 1716 ft ² /sec ² -°R
<i>S</i>		wing reference area, 700.00 in ²
<i>T_{t,j}</i>		average jet total temperature, °R
<i>w_i</i>	(WI)	ideal weight-flow rate, lbf/sec
<i>w_p</i>	(WP)	measured weight-flow rate, lbf/sec
<i>x, y, z</i>		model coordinates, in.
α	(ALPHA)	angle of attack, deg
β		sideslip angle, deg
γ		ratio of specific heats, 1.3997 for air
δ_p	(DELTAP)	resultant pitch-vector angle, $\tan^{-1} \frac{F_N}{F_j}$, deg
$\delta_{v,p}$		geometric pitch-vector angle for one or two nozzles, measured from nozzle centerline, positive for downward deflec- tion, deg
δ_y	(DELTAY)	resultant yaw-vector angle, $\tan^{-1} \frac{F_s}{F_j}$, deg
θ		nozzle cant angle, measured from nozzle centerline, positive outboard, deg
Subscripts:		
<i>l</i>		left
<i>r</i>		right
Abbreviations:		
C-D		convergent-divergent
FS		fuselage station (axial location described by distance from model nose), in.

STOL	short take-off and landing
2-D	two-dimensional

Apparatus and Procedure

Model

General arrangement. The overall model external geometry is presented in figure 1. The model consisted of two major portions: the nonmetric forebody and metric afterbody. The metric portion of the model aft of FS 39.00, which is supported by the force balance, consisted of the propulsion system, afterbody, and nozzles. The model had essentially rectangular cross sections with rounded corners. The body lines were chosen to enclose the internal propulsion system and to fair into the afterbody that enclosed the nozzles. The maximum width and height were 9.00 in. and 5.00 in., respectively. Table 1(a) presents external geometry coordinates for both the fixed nonmetric forebody and the metric afterbody up to FS 48.20. A 0.06-in. gap between the nonmetric forebody and metric afterbody was required to prevent fouling of the force balance. A flexible plastic strip was inserted into circumferentially machined grooves in each component to impede flow into and out of the internal model cavity.

Nozzle integration. Multiaxis thrust vectoring for this investigation was achieved through a nozzle integration concept in which twin pitch-vectoring exhaust nozzles were canted. With the nozzles canted, pitching moment is obtained by symmetric nozzle pitch deflection, whereas yawing moment is produced from differential nozzle pitch deflection. The model was tested with cant angles of 0°, 30°, and 45°. Photographs that show rear views of the three nozzle integrations are presented in figure 2. Overall views of the three configurations are shown in figure 3. This configuration represents a typical twin-engine fighter afterbody integration. Nozzle spacing was defined by the requirement of canting each nozzle up to 45° without physical interference on the other nozzle. External afterbody lines for these three configurations are presented in figure 4, and external coordinates between FS 48.20 and FS 57.82 are presented in tables 1(b) to 1(d). Changes to the afterbodies occurred only between FS 48.20 and FS 57.82.

Exhaust nozzles. The two-dimensional convergent-divergent (2-D C-D) nozzle is a nonaxisymmetric exhaust system in which a symmetric contraction and expansion process takes place internally in the vertical plane. Basic nozzle components consist of upper and lower flaps to regulate the contraction and expansion process and flat nozzle

sidewalls to contain the flow laterally. The flap inner-surface geometry (on full-scale hardware) can be varied or altered by actuators so that (1) the engine power setting can be changed by varying the throat height and (2) the expansion surface angle (flat surface downstream of the throat) can be varied for optimum expansion of the exhaust flow. The 2-D C-D nozzle can be designed to vector the exhaust flow up or down (in the pitch plane) by rotating the upper and lower flaps independently. Typical full-scale 2-D C-D nozzles are shown in references 6 and 18.

The subscale 2-D C-D nozzle models tested during this investigation are shown in figure 5. These nozzles are fixed-geometry representations of a variable geometry nozzle at a dry-power or cruise power setting with a design NPR of 3.23. The nozzle throat area (3.50 in^2) and expansion ratio (1.12) were sized to be consistent with advanced mixed-flow turbofan cycles. The ratio of total throat area to maximum body cross-sectional area was 0.16 and the nozzle throat aspect ratio was 3.50. Geometric pitch thrust-vector angles of 0° , 10° , 20° , and 30° were tested during this investigation. Sketches of these nozzle configurations are presented in figure 5, and photographs of the nozzles with various pitch-vector angles are shown in figure 6. Table 2 presents nozzle and sidewall internal and external coordinates for the various nozzle configurations.

An alternate 2-D C-D nozzle with long divergent flaps was also tested. This design represents a nozzle that may be required for aircraft designed to cruise efficiently at supersonic speeds. Generally, very high nozzle expansion ratios are required for efficient supersonic cruise. With a longer divergent flap, a lower internal divergence angle and external boattail angle result when compared with the standard flap. Both of these items should result in higher installed nozzle performance. Sketches of this nozzle are presented in figure 5 and photographs are presented in figure 7. This nozzle had the same throat area and expansion ratio as the baseline nozzle. However, the nozzle boattail angle was 12.5° , whereas the boattail angle for the standard nozzle was 18.3° . Only geometric pitch thrust-vector angles of 0° and 20° at cant angles of 0° and 30° were tested with the longer flaps.

Twin-Jet Propulsion Simulation System

A sketch of the twin-jet simulation system is presented in figure 8. An external high-pressure air system provides a continuous flow of clean, dry air at a controlled temperature of about 530°R at the nozzles. This high-pressure air is brought through the support strut by six tubes into a high-pressure chamber. Here the air is divided into two separate flows

and is passed through flow-control valves. These manually operated valves are used to balance the exhaust-nozzle total pressure in each duct. As shown in figure 9, the air in each supply pipe is then discharged perpendicularly to the model axis through eight sonic nozzles equally spaced around the supply pipe. This method was designed to eliminate any transfer of axial momentum as the air is passed from the nonmetric portion to the metric portion (portion of model supported by force balance) of the model. Two flexible metal bellows are used as seals and serve to compensate for the axial forces caused by pressurization. The cavity between the supply pipe and bellows is vented to model internal pressure. The air is then passed through a choke plate and screen, an instrumentation section, and a transition section to the exhaust nozzles being tested. Canting the nozzles was accomplished by rotating each of the exhaust nozzles about its respective thrust axis at a nozzle rotational joint. (See fig. 8.)

Wind Tunnel and Support System

This investigation was conducted in the Langley 16-Foot Transonic Tunnel, a single-return atmospheric wind tunnel with a slotted octagonal test section and continuous air exchange. The wind tunnel has a continuously variable airspeed up to a Mach number of 1.30. Test-section plenum suction is used for speeds above a Mach number of 1.05. A complete description of this facility and operating characteristics can be found in reference 19.

The model was supported by a sting strut; the model center of rotation is indicated in figure 1. The top-mounted strut arrangement was chosen in order to minimize any support interference effects at high angles of attack. Sideslip angle was obtained by rotating the model relative to the strut to the appropriate angle. Thus, the strut incidence angle was held at 0° . The strut had a 45° leading-edge sweep, a 20.00-in. chord, and a 5-percent-thick hexagonal airfoil in the streamwise direction. The model blockage ratio was 0.0015 (ratio of model cross-sectional area to test-section area), and the maximum blockage ratio, including the support system, was 0.0020.

Instrumentation

Forces and moments on the metric portion of the model were measured by a six-component strain-gage balance. This force balance measured forces and moments resulting from nozzle gross thrust and the external flow field over that portion of the model aft of FS 39.00. External-seal static pressures were measured at five points in the seal gap at the metric break. All orifices were located on the nonmetric

forebody and were spaced symmetrically about the model perimeter. Two internal pressures were measured at the metric-gap station. These pressure measurements were then used to correct the measured forces and moments for pressure area tares as discussed in the appendix of reference 11.

Flow conditions in each nozzle were determined from four total-pressure probes and one total-temperature probe located at FS 54.22 in the instrumentation section aft of the choke plate and screen. Nozzle total pressure was determined from these measurements. Weight flow of the high-pressure air supplied to the exhaust nozzles was determined from a calibrated choked venturi system located in the air line external to the wind tunnel. (See ref. 20.) All pressures were measured with individual pressure transducers.

Data Reduction

All data for both the model and the wind-tunnel facility were recorded simultaneously on magnetic tape. Approximately 50 frames of data, taken at a rate of 10 samples per second for 5 sec, were used for each data point. Average values of the recorded data were used to compute standard force and moment coefficients. Although this configuration was tested without a wing, a reference wing was assumed in order to nondimensionalize the force and moment coefficients. The wing reference dimensions for this configuration were based on the fact that the body overall length and nozzle throat areas were sized to approximate a 10-percent-scale advanced fighter aircraft. Composite dimensions for this configuration were chosen by averaging those of several fighter configurations. (See refs. 6, 9, 11, and 13.) As a result, this model had a wing reference area of 700.00 in², a wing mean geometric chord of 18.00 in., and a span of 40.00 in. The center of gravity (moment reference center) was located from the nose at 69 percent of the body length, which is typical for fighter configurations. This location corresponds to approximately 0.25 c for these configurations.

Forces and moments measured by the force balance are corrected for tare forces that result from the combined effect of loading the balance with the bellows system and from momentum tare forces. Axial

force and pitching moment are also adjusted to the condition of free-stream static pressure acting across the balance metric break at FS 39.00. Detailed discussions of these procedures can be found in references 11, 17, and 19.

The adjusted forces and moments measured by the force balance are transferred from the body axis of the metric portion of the model to the stability axis. Attitude of the nonmetric portion of the model relative to gravity was determined from a calibrated attitude indicator in the model nose. Angle of attack α , the angle between the afterbody centerline and the relative wind, was determined by applying terms for afterbody deflection, caused when the model and balance bend under aerodynamic load, and a flow angularity term to the angle measured by the attitude indicator. The flow angularity adjustment was 0.1°, which is the average angle measured in the Langley 16-Foot Transonic Tunnel.

Tests

This investigation was conducted in the Langley 16-Foot Transonic Tunnel at Mach numbers of 0.20, 0.60, 0.80, 0.90, and 1.20 and at angles of attack from 0° to 27.5°. Nozzle pressure ratio varied from 1.0 (jet off) to 8.0, depending on Mach number. Most model configurations were tested at angles of attack from 0° to 14.5°, and selected configurations were subsequently tested up to 27.5°. All configurations were tested at 0° sideslip, and selected configurations were also tested at 5° sideslip. Basic data were obtained by varying nozzle pressure ratio at 0° and 20° angle of attack and by varying angle of attack at $NPR = 1.0$ (jet off) and at a fixed (different for each Mach number) nozzle pressure ratio. The fixed nozzle pressure ratio represented a typical operating pressure ratio for a turbofan engine at that Mach number. These nozzle pressure ratios included: 3.2 for $M = 0.20$, 4.8 for $M = 0.60$, and 6.0 for $M = 0.90$. Reynolds number per foot varied from 3.2×10^6 at $M = 0.20$ to 4.0×10^6 at $M = 1.20$. All tests were conducted with a 0.10-in-wide boundary-layer transition strip consisting of No. 120 silicon carbide grit sparsely distributed in a thin film of lacquer. A single strip was located 1.00 in. from the tip of the forebody nose.

Presentation of Results

The results of this investigation are presented in both tabular and plotted form. Table 3 is an index to the results contained in tables 4 to 36. Static performance data for the various nozzle configurations are presented in tables 4 to 8, and aerodynamic characteristics for all the configurations tested are presented in tables 9 to 36. Skin-friction coefficients plus wave-drag coefficients for selected configurations are tabulated in table 37. The computer symbols appearing in these tables are defined in the section entitled "Symbols" with their corresponding mathematical symbols. Comparison and summary plots for selected configurations are presented in figures 10 to 57 as follows:

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Discussion

Nozzle Static Performance

Static ($M = 0$) performance characteristics for the various nozzles that show the effects of symmetric and differential pitch deflection, cant angle, and nozzle divergent flap length are presented in figures 10 to 16. Static nozzle performance is presented as internal thrust ratio F_j/F_i , resultant thrust ratio F_r/F_i , resultant pitch-vector angle δ_p , resultant yaw-vector angle δ_y , and nozzle discharge coefficient w_p/w_i .

Effects of pitch vectoring. The effects of symmetric pitch vectoring on nozzle static performance for the three nozzle cant angles with the standard divergent flaps are presented in figure 10. Peak nozzle performance for the unvectored nozzles generally occurred between nozzle pressure ratios of 3.0 and 4.0. Typically, the peak nozzle performance is obtained at the jet nozzle pressure ratio required for fully expanded flow (the design pressure ratio), which for the current nozzles is 3.23. There was essentially no effect of cant angle on the resultant thrust ratio for the unvectored nozzle over the nozzle pressure range tested. (Compare figs. 10(a), 10(b), and 10(c).)

The effect of symmetric pitch vectoring on resultant pitch-vector angle for the three cant-angle configurations tested is also shown in figure 10. Symmetric pitch vectoring, that is, deflection of the nozzle flaps for both nozzles in the same direction, resulted in pure pitch vectoring. This pitch-vectoring concept was very effective. For the configuration with 0° cant, resultant pitch-vector angles were greater than the geometric pitch-vector angle tested over the full test range of nozzle pressure ratio. Such large pitch-vector angles, typical of pitch vectoring by differential flap deflection (refs. 8 to 10 and 13), are caused in part by local overexpansion at the nozzle throat on the lower flaps of the nozzle. This very localized region of overexpanded flow forms immediately downstream of the throat and forces the exhaust flow to overturn before expanding onto the lower flap.

As expected, there was a decrease in resultant pitch-vector angle as cant angle was increased. The decrease in δ_p with increasing cant angle is most obvious for geometric pitch-vectoring angles of 20° and 30° . This loss in pitch-vector angle results from a decrease in the jet normal force as the nozzles are rotated about their axes.

These effects of pitch vectoring and cant angle are summarized for a nozzle pressure ratio of 3.2 (design NPR) in figures 11 and 12, respectively, where resultant thrust ratios and pitch-vector angles are shown as a function of both pitch-vector angle and cant angle. Figure 11 shows that there is about a 1-percent variation in resultant thrust ratio as the geometric pitch-vector angle increases for the configuration with 0° cant. This relatively small effect on thrust indicates that there are essentially no turning losses for this nozzle; this is a typical result for 2-D C-D nozzles with differential-flap vectoring, because the flow is turned essentially at subsonic Mach numbers (refs. 8 to 10). However, for both the 30° - and 45° -cant configurations, there is a significant loss in resultant thrust ratio with increasing pitch-vector angle. This loss is a result of a reduction in the total jet normal force as each nozzle is rotated about the axis (loss equivalent to $(1 - \cos\theta)C_{F,N}$ at $\theta = 0^\circ$). At the same time, there are side-force components of the resultant thrust that, for this twin-engine installation, cancel each other out. Also shown in figure 11 is the variation of F_r/F_i with cant angle for $\delta_{v,p} = 20^\circ$. The dashed line represents the estimated resultant thrust ratio when resultant pitch-vector angle equals geometric pitch-vector angle. As can be seen, the losses in F_r/F_i as θ increased were greater than the losses predicted for equal turning ($\delta_p = \delta_{v,p}$). This effect on F_r/F_i is a result of the overturning ($\delta_p > \delta_{v,p}$) previously discussed. Internal overturning produces a normal force that represents a larger percentage of the total resultant force F_r than normal-force levels that would result from equal turning. When the normal force is reduced by canting, the percentage reduction in F_r for the overturned configurations is greater than the percentage reduction in F_r for equal turning. Thus, for the $\delta_{v,p} = 20^\circ$ case presented in figure 11, F_r/F_i is always lower for the overturned configurations when $\theta > 0^\circ$.

The effect of cant on resultant pitch-vector angles is summarized in figure 12. The dashed lines represent estimated values for the equal-turning case, for which the resultant pitch-vector angle equals the geometric angle. As can be seen, resultant pitch-vector angles were greater than the estimated values at all the cant angles tested. Even though δ_p diminishes with increasing cant angle, the overturning phenomenon keeps pitch levels higher than estimated.

Effects of differential pitch vectoring. The effects of differential pitch vectoring on nozzle static performance for various combinations of vector and cant angle are presented in figure 13. For cant angles greater than 0° , symmetric or equal differential pitch vectoring, such as $\delta_{v,p,l} = -20^\circ$ and $\delta_{v,p,r} = 20^\circ$,

resulted in only pure yaw vectoring. For example, only resultant yaw angles were obtained for the 30° and 45° cant configurations for 20° of pitch deflection. For nonsymmetrical or unequal pitch vectoring, such as $\delta_{v,p,l} = 0^\circ$ and $\delta_{v,p,r} = 20^\circ$, vectoring in both pitch and yaw occurs when $\theta \neq 0^\circ$ (multiaxis vectoring). For the two multiaxis-vectoring configurations of figure 13, the resultant pitch-vector angles are about equal to those measured for nozzle-vector angles of $\delta_{v,p,l} = 10^\circ$ and $\delta_{v,p,r} = 10^\circ$. These results suggest that for appropriate combinations of $\delta_{v,p}$ and cant, there is little or no coupling or interference of the longitudinal and lateral control moments at forward speeds. The large losses in F_r/F_i that occur for the symmetric differential-vectoring configurations result from the cancellation of the respective jet normal forces for each of the nozzles and hence do not diminish resultant thrust. Resultant thrust ratio increased with cant angle for the nozzle geometric pitch-vector-angle combination (20°), because side-force contributions, which increase with θ , are included in F_r . (See section entitled "Symbols".)

Resultant yaw-vector angles at $NPR = 3.2$ are summarized in figure 14. The dashed lines represent an estimated δ_p when resultant pitch-vector angle equals the geometric pitch-vector angle. As with resultant pitch-vector angles, resultant yaw-vector angles were greater than estimated values at all cant angles tested; this difference indicated a favorable effect of nozzle overturning.

Effects of nozzle flap length. The effects of symmetric pitch vectoring and cant angle on nozzle static performance for the nozzles with the long divergent flaps are presented in figure 15; in general, the effects are similar to those discussed for the nozzle with the standard flap. A comparison of the static performance of nozzles with the standard and long flaps is presented in figure 16. At $\delta_v = 0^\circ$, the resultant thrust ratios were about 1 percent lower for the nozzles with the long flaps at $NPR > 3.0$ for both the 0° - and 30° -cant configurations. This lower thrust performance is caused by greater nozzle internal-friction losses for the nozzle with the long flaps. For 20° pitch vectoring, resultant thrust ratios were 1 to 4 percent lower at $NPR > 4.0$ for the nozzle with the long flaps at $\theta = 0^\circ$; these ratios were only about 1 percent lower at $\theta = 30^\circ$. At $NPR > 3.0$, these nozzles had flow-turning characteristics that were nearly identical to the nozzles with the standard flaps.

Performance at Forward Speeds

Effects of thrust vectoring. The effects of symmetric and differential pitch thrust vectoring on

the total aerodynamic characteristics are presented in figures 17 to 20 for the configuration with 30° cant and with the standard nozzle flaps. These results are similar to those obtained for the other configurations tested, such as the 0°- and 45°-cant models with the standard flaps and the 0°- and 30°-cant configurations with the long nozzle flaps. Only the relative magnitudes of the various performance parameters are different for these other configurations. Consequently, results for these configurations are found in tables but are not plotted. To illustrate the effects of nozzle pressure ratio and angle of attack, two types of data presentations are made. First, the total aerodynamic characteristics are shown in figures 17 and 19 as a function of nozzle pressure ratio at $\alpha = 0^\circ$. Second, the variation of the total longitudinal aerodynamic characteristics with angle of attack is presented in figures 18 and 20 at the scheduled nozzle pressure ratio for each Mach number.

The variation of the total aerodynamic characteristics for the vectored 30°-cant configuration (fig. 17) followed expected trends. At 0° pitch vectoring, there was little or no effect of nozzle pressure ratio on total lift coefficient. For the other vector angles tested, increasing NPR resulted in an expected increase in total lift coefficient. The increment in C_L between $\delta_{v,p,l} = \delta_{v,p,r} = 0^\circ$ and the other pitch-vector angles at jet-off conditions (NPR = 1) is a result of the aerodynamic flap effect from the deflected nozzle flaps at $\delta_{v,p} > 0^\circ$. As nozzle pressure ratio increased, C_L also increased. This increase in C_L was caused primarily by the jet-lift component of the nozzle resultant thrust and some jet-induced lift. For differential pitch vectoring, total side-force coefficient C_Y exhibited similar trends as the differential pitch-vector angles were increased from 0° to 30°. For differential pitch vectoring, C_Y is composed primarily of the side-force component of the resultant thrust and jet-induced side force.

Drag-minus-thrust coefficient varied nearly linearly with nozzle pressure ratio regardless of the combinations of pitch-vector angles from either symmetric or differential pitch vectoring (figs. 17 and 19). The differences between $C_{(D-F)}$ for $\delta_{v,p} = 0^\circ$ and the other pitch-vector angles resulted from thrust losses caused by turning the exhaust vector away from axial direction and from generally higher drag on the vectored configurations. The increasing magnitude of negative numbers for $C_{(D-F)}$ indicates improved performance from either higher thrust or lower drag.

Symmetric pitch vectoring only produced longitudinal forces and moments. On the other hand, both yawing and rolling moments (but no longitudi-

nal forces or moments) result from differential pitch vectoring for $\theta \neq 0^\circ$. (See fig. 19.) The levels of rolling-moment coefficient shown for $\delta_{v,p} = \pm 30^\circ$ are about the same as those produced by typical rudder deflections for a fighter aircraft (ref. 13). Generally, use of a rudder for directional control results in adverse rolling moments; that is, a positive rudder deflection causes a nose-left yawing moment accompanied by positive rolling moments. These adverse rolling moments are present because the side force generated by the rudder deflection is above the moment reference center of the aircraft. This was not the case for the canted nozzle configurations, for which proverse roll resulted from the anhedralized nozzles. Dihedraled nozzles would, of course, produce adverse rolling moment.

Pitch and yawing moments (multiaxis vectoring) were produced by unequal differential pitch vectoring, that is by deflection of the left nozzle 0° and the right nozzle 20°, as shown in figure 19. The pitching moment that results was equivalent to about 10° of symmetric pitch thrust vectoring, and the yawing moment was equivalent to about $\pm 10^\circ$ of differential vectoring. These results show that there are generally no coupling or interference effects of the longitudinal control moment on the lateral moments during single-axis (pitch or yaw) thrust vectoring. This is usually not the case for the typical fighter aircraft (ref. 21) with conventional aerodynamic control surfaces; for these aircraft, there is often a coupling of the longitudinal and lateral moments, particularly at high angles of attack.

The effects of angle of attack on the total aerodynamic characteristics for both symmetric and differential pitch vectoring are presented in figures 18 and 20, respectively. The force or moment coefficients that result from changing nozzle pitch-vector angle from 0° to any of the other combinations of vector angles tested, at either jet-off or jet-on conditions, remain essentially constant over the entire angle-of-attack range for all Mach numbers tested. Similar results were found in references 9, 11, and 13. A comparison of data (e.g., tables 26 and 27) shows that force and moment coefficients also remained constant over the entire angle-of-attack range at $\beta = 5^\circ$. The main advantage of powered controls over aerodynamic controls would be at very low speed or at high angles of attack, where conventional aerodynamic controls lose effectiveness.

Lift and side-force coefficients for the canted nozzle installation can be predicted by using the force characteristics from the 0°-cant configuration. This process is illustrated in figure 21, in which predicted values of C_L and C_Y are compared with measured

values. The predicted values of C_L and C_Y are only a function of C_L at $\theta = 0^\circ$ with $\cos \theta$ and $\sin \theta$, respectively. With a few exceptions, there was good agreement between the predicted and measured values of both lift and side-force coefficients for the various Mach numbers tested. The predicted values were lower than the measured values at subsonic Mach number and higher than the measured values at $M = 1.2$.

The effects of symmetric and differential pitch vectoring on the jet-induced aerodynamic characteristics are presented in figures 22 to 25 for the 30° -cant configuration with the standard nozzle flaps. As stated previously, the results are typical for the other configurations tested. Jet-induced lift varied from about 25 to 50 percent of the total aft-end lift at Mach numbers from 0.60 to 0.90. (Compare fig. 17 with fig. 22.) Similar results were found in references 22 and 23. There was little or no effect on $C_{D,a}$ from either nozzle pressure ratio or pitch vector angles, except for the 30° -pitch vectored configuration. The jet-induced side force (fig. 24) varied from 15 to 25 percent of the total aft-end side force. Again, these results are typical and similar to those of reference 13. As shown in figures 23 or 25, jet-induced forces and moments (the difference between coefficients at some NPR with jet off) generally showed little variation as angle of attack was increased.

Effects of nozzle cant angle. The effects on afterbody aeropropulsive characteristics due to canting with both the standard and long nozzle flaps are presented in figures 26 to 29. The variation of the aeropropulsive parameter $F - D/F_i$ and aft-end drag coefficient $C_{D,a}$ with nozzle pressure ratio is shown at Mach numbers from 0.60 to 1.20 at an angle of attack of 0° . As expected, because drag increased with increasing Mach number, the aeropropulsive performance of all configurations decreased with increasing Mach number. Figures 30 and 31 summarize these results as a function of Mach number at the NPR schedule and are representative of results at other pressure ratios at a particular Mach number.

Afterbody aeropropulsive performance was equal to or slightly higher for the unvectored 30° -cant installation than for the 0° -cant installation at subsonic speeds for the nozzles with the standard nozzle flaps (fig. 30(a)). The unvectored 45° -cant configuration always had lower performance than the other two configurations at subsonic speeds and higher performance at $M = 1.2$. At subsonic speeds, the difference between the canted and uncanted nozzle installations was less than 0.05 percent of $F - D/F_i$.

At jet-off conditions and at subsonic speeds, aft-end drag coefficient was 0.0004 to 0.0018 lower for the 0° -cant configuration than for the other two configurations (fig. 30(a)). At jet-on conditions, however, the 0° -cant configuration had the highest aft-end drag coefficient at all Mach numbers tested. The difference in aft-end drag for these configurations was primarily due to nozzle installation effects; these configurations had nearly identical computed skin-friction and wave drag (table 37). These results indicate that propulsion-induced (jet interference) effects were more beneficial for the canted-nozzle installations than the 0° -cant installation. With the long flaps, afterbody aeropropulsive performance was always greater for the 30° -cant installation than for the 0° -cant installation. (See fig. 31(a).) The canted-nozzle installation with the long flaps also experienced more beneficial jet interference effects than the 0° -cant configuration; these results were similar to the canted configurations with the standard flaps.

The pitch-vectored, canted-nozzle installations had higher afterbody aeropropulsive performance than the 0° -canted nozzle configuration with either the standard or long nozzle flaps. (See fig. 30(b) or 31(b).) This improved performance was generally due to lower aft-end drag at jet-on conditions.

The effects of varying nozzle cant angle on the total aerodynamic characteristics for the nozzles with both the standard and long flaps for symmetric and differential pitch deflections of 20° are presented in figures 32 to 34. Thrust-removed aerodynamic characteristics for these same configurations are given in figures 35 to 37. The basic data presentation is similar to the format described for thrust vectoring. These results, along with those for the other pitch-vector angles, are summarized as a function of pitch-deflection angle in figures 38 to 43 at the operating NPR for each Mach number. Although discussion of the results at this particular schedule of nozzle pressure ratio would generally be applicable for other schedules, the relative differences between comparisons may vary.

The variation of drag-minus-thrust coefficient, total lift coefficient, and pitching-moment coefficient with pitch-vector angle is summarized in figures 38 and 39 for the nozzles with the standard and long flaps, respectively. These results show that both lift and pitching-moment coefficients vary nearly linearly with pitch thrust-vector angle. As expected, there is a decrease in the magnitude of C_L and C_m as cant angle increases, since resultant pitch-vector angle decreases with increasing cant angle. Figure 39 shows that similar results were obtained for the configurations with the long nozzle flaps.

The variations of the total lateral aerodynamic characteristics with differential pitch-vector angles are presented in figure 40 for the configuration with the standard nozzle flaps. Similar to symmetric pitch-vectoring results on longitudinal characteristics with varying geometric pitch-vector angle, the variation of the lateral characteristics is nearly linear with differential pitch-vector angle. Side-force and yawing-moment coefficients increase in magnitude with increasing cant angle, since resultant yaw-vector angle increases. (See fig. 13.) Maximum values of rolling moment are obtained for the 0° -cant configuration, because the rolling-moment arm decreases with increasing cant angle.

Effects of nozzle flap length. The effects of varying nozzle flap length on the afterbody aeropropulsive characteristics are presented in figures 44 and 45 and are summarized in figures 48 and 49. The configurations with the long flaps at both $\theta = 0^\circ$ and 30° generally had lower afterbody aeropropulsive performance ($F - D/F_i$) than those with the standard flaps, except for the unvectored configurations at $M \geq 0.90$. (See figs. 48(a) and 49(a).) This inferior performance for the long-flap installations reflects the low static-thrust characteristics discussed previously and shown in figure 16. The unvectored long-flap configurations have lower aft-end drag than the standard flap installations at both jet-off and jet-on conditions (figs. 48(a) and 49(a)). The lower aft-end drag at $\delta_{v,p} = 0^\circ$ probably results from lower nozzle boattail drag. For the pitch-vectored configurations, however, aft-end drag is significantly higher for the long-flap nozzles than for the standard nozzles (figs. 48(b) and 49(b)). For this case, the increase in drag probably results from higher boattail drag (the long flap extends farther into the free-stream flow than the standard flap). As a result, afterbody aeropropulsive performance for the pitch-vectored, long-flap nozzles is significantly lower than that for the configurations with the standard flaps.

The effects of varying nozzle flap length on the total aerodynamic characteristics for the 30° -cant configuration at a pitch-vector angle of 20° are presented in figure 46. Thrust-removed aerodynamic characteristics are given in figure 47. These results, along with those for the 0° pitch-vector angle, are summarized in figures 50 to 53.

Comparisons of drag-minus-thrust, total lift, and pitching-moment coefficients for the standard-flap and long-flap nozzle configurations for the 0° - and 30° -cant installations are presented in figures 50 and 51, respectively. At 20° pitch vectoring, lift and the resulting pitching-moment coefficients and the resulting pitching-moment co-

efficients for the long-flap nozzle configurations are higher, sometimes significantly, than for the configurations with the standard nozzle flaps. Lift coefficients for the long-flap nozzles were about 60 to 85 percent greater than lift coefficients for standard flaps at Mach numbers from 0.60 to 1.20. These nozzles had nearly the same jet normal force. Thus, this increase in lift exists essentially because the long-flap configurations have much higher induced lift. (Compare tables 34 and 36.) Typically, thrust vectoring reduces the recompression of the flow on the afterbody/nozzle upper surface while increasing pressures on the lower surface; this combination generally results in the generation of induced lift. Apparently, the higher induced lift is achieved on the long-flap configurations because these pressures have a larger projected area to work against. At these conditions, the long-flap nozzle configurations have lower thrust-minus-drag characteristics, which were discussed previously.

Control-Power Characteristics

An assessment of the multiaxis control-power characteristics from thrust vectoring is made from comparisons of the effectiveness of the various powered and aerodynamic control effectors available from this model and other configurations. The various longitudinal and directional control-power parameters that result from thrust vectoring at $\alpha = 0^\circ$ are presented in figures 54 and 55, respectively. These parameters at a constant Mach number are essentially only a function of nozzle pressure ratio, because the increments in aerodynamic coefficient that resulted from thrust vectoring were independent of angle of attack. (See section entitled "Effects of thrust vectoring".) The decrease in control power that occurs as Mach number increases is the result of a decrease in thrust coefficient (at constant NPR). The decrease in thrust is caused primarily by the decrease in free-stream pressure as the Mach number increases and, to a lesser extent, by the effects of free-stream dynamic pressure.

Longitudinal control. Longitudinal control power C_{m_δ} from powered and aerodynamic controls is presented in figure 56 as a function of Mach number at $\alpha = 0^\circ$. Longitudinal control power from pitch vectoring was obtained for each Mach number shown at a typical operating pressure ratio. In addition to longitudinal control power from the current investigation, values of $C_{m_{\delta_v}}$ from pitch-vectoring 2-D C-D nozzles on a transonic fighter model (ref. 11) and a supersonic fighter model (ref. 13) are also shown. Longitudinal control power generated by a horizontal tail for the transonic fighter model (ref. 11) and

the F-15 aircraft (ref. 6) and by a canard for the supersonic cruise fighter (ref. 13) is also presented in figure 56. Symbols are used to distinguish longitudinal control power from thrust vectoring, and lines are used to denote aerodynamic controls.

At low speeds, pitch vectoring for the current configuration provided the same level of control power as the aerodynamic controls. For the transonic fighter model of reference 11, longitudinal control power from pitch vectoring was about 3.4 times greater than that provided by the horizontal tail. The decrease in magnitude of the powered controls with increasing Mach number is caused by the decrease in thrust discussed previously. Because aerodynamic controls are usually sized for low speeds, they are generally more effective than necessary at high speeds. Thrust vectoring could be used to augment the control power provided by the aerodynamic controls, particularly at low speeds. However, the main advantage of powered controls will be at high angles of attack. According to references 11 and 13, longitudinal control power from thrust vectoring is not dependent upon angle of attack, whereas control power from aerodynamic controls usually decreases with increasing angle of attack.

Directional control. A comparison, at $\alpha = 0^\circ$, of directional control power $C_{n\delta}$ from powered and aerodynamic controls is presented in figure 57. Directional control was obtained from thrust by deflecting nozzle sidewall flaps in references 13 and 15 and from post-exit vanes in reference 15. Directional control generated by the F-15 aircraft rudder is also shown in figure 57. The level of directional control from the rudder is typical for this type of control. (See ref. 13.)

Directional control from thrust vectoring exhibited similar characteristics with Mach number as those previously noted for longitudinal control power from thrust vectoring. At low speeds, directional control power from thrust vectoring was greater than that provided by the aerodynamic control. In fact, $C_{n\delta}$ from thrust vectoring was even greater than the rudder at $NPR = 2.0$ for the 30° -cant configuration (fig. 55(a)). Directional control provided by the rudder was greater than control provided by thrust vectoring at $M > 0.50$. These aerodynamic controls are also generally sized for low-speed operations.

Conclusions

An investigation has been conducted in the Langley 16-Foot Transonic Tunnel to determine the multiaxis thrust-vectoring capability of canted two-dimensional convergent-divergent exhaust nozzles installed on a twin-jet afterbody model. Pitch

vectoring was accomplished by deflection of the nozzle upper and lower divergent flaps. Several combinations of symmetric and differential pitch-deflection angles were tested at nozzle cant angles of 0° , 30° , and 45° . The effect of varying nozzle divergent flap length was also studied. This investigation was conducted at Mach numbers from 0.20 to 1.20, at angles of attack from 0° to 27.5° , at nozzle pressure ratios up to 8.0, and at sideslip angles of 0° and 5° . An analysis of the results indicates the following conclusions:

1. At static conditions, resultant pitch-vector angles were always greater than the geometric angle for symmetrical pitch vectoring. This resulted from the overturning of the nozzle flow in pitch.
2. Differential pitch vectoring for the canted nozzle configurations produced resultant yaw angles that were always greater than the geometric angles. This also resulted from the overturning of the pitch-vectorized flow.
3. The effects of symmetric pitch vectoring on the longitudinal aerodynamic characteristics followed expected trends. The magnitude of both lift and pitching-moment coefficients increased with increasing nozzle pressure ratio and/or nozzle deflection angle. Similar effects were obtained for the lateral aerodynamic characteristics from differential pitch vectoring.
4. Symmetric and differential pitch vectoring produced force and moment increments which remained essentially constant over the entire angle-of-attack range for all Mach numbers tested.
5. Lift and pitching moment decreased with increasing nozzle cant angle for symmetric pitch vectoring. For differential pitch vectoring, side force and yawing moment increased with increasing nozzle cant angle.
6. Afterbody aeropropulsive performance for the unvectored 30° -cant installation was equal to or better than the performance for the 0° -cant installation, regardless of the nozzle flap length. This higher performance resulted from the 30° -cant installations having lower aft-end drag at power-on conditions.
7. The configurations with the long nozzle flaps generally had lower aft-end drag when unvectored, and significantly higher aft-end drag when vectored.
8. The vectored long-flap nozzle configurations had 60 to 85 percent higher jet-induced lift than the configurations with the standard flaps.

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Table 1. Body Coordinates

(a) Nose/forebody

x , in.	y , in.	z , in.	x , in.	y , in.	z , in.
0.000	0.000	0.000	6.000	0.000	-1.724
1.000	0.000	-0.320		.320	-1.724
	.040	-.320			-1.493
	.200	-.277			
	.317	-.160			
	.360	.000			
	.317	.160			
	.200	.277			
	.040	.320			
2.000	0.000	-0.631	8.000	0.000	-2.134
	.084	-.631		.508	-2.134
	.399	-.547		1.575	-1.848
	.630	-.316		2.356	-1.067
	.715	.000		2.642	.000
	.630	.316		2.356	1.067
	.399	.547		1.575	1.848
	.084	.631		.508	2.134
	.000	.631		.000	2.134
3.000	0.000	-0.929	9.000	0.000	-2.289
	.132	-.929		.631	-2.289
	.596	-.805		1.776	-1.982
	.937	-.465		2.613	-1.144
	1.061	.000		2.920	.000
	.937	.465		2.613	1.144
	.596	.805		1.776	1.982
	.132	.929		.631	2.289
	.000	.929		.000	2.289
4.000	0.000	-1.212	10.000	0.000	-2.405
	.186	-.1212		.777	-2.405
	.792	-.1049		1.980	-2.083
	1.235	-.606		2.860	-1.203
	1.398	.000		3.182	.000
	1.235	.606		2.860	1.203
	.792	1.049		1.980	2.083
	.186	1.212		.777	2.405
	.000	1.212		.000	2.405

Table 1. Continued

(a) Continued

x , in.	y , in.	z , in.	x , in.	y , in.	z , in.
12.000	0.000	-2.500	22.000	0.000	-2.500
	1.149	-2.500		2.682	-2.500
	2.399	-2.165		3.591	-2.256
	3.314	-1.250		4.256	-1.591
	3.649	.000		4.500	-.682
	3.314	1.250		4.500	.682
	2.399	2.165		4.256	1.591
	1.149	2.500		3.591	2.256
	.000	2.500		2.682	2.500
15.000	0.000	-2.500	25.000	0.000	-2.500
	1.681	-2.500		3.500	-2.500
	2.931	-2.165		4.000	-2.366
	3.846	-1.250		4.366	-2.000
	4.181	.000		4.500	-1.500
	3.846	1.250		4.500	1.500
	2.931	2.165		4.366	2.000
	1.681	2.500		4.000	2.366
	.000	2.500		3.500	2.500
18.000	0.982	-2.500	39.000	0.000	-2.500
	1.964	-2.500		3.500	-2.500
	3.214	-2.165		4.000	-2.366
	4.129	-1.250		4.366	-2.000
	4.464	.000		4.500	-1.500
	4.129	1.250		4.500	1.500
	3.214	2.165		4.366	2.000
	1.964	2.500		4.000	2.366
	.000	2.500		3.500	2.500
19.500	0.000	-2.500	42.000	0.000	-2.500
	2.000	-2.500		3.500	-2.500
	3.250	-2.165		4.000	-2.366
	4.165	-1.250		4.366	-2.000
	4.500	.000		4.500	-1.500
	4.165	1.250		4.500	1.500
	3.250	2.165		4.366	2.000
	2.000	2.500		4.000	2.366
	.000	2.500		3.500	2.500

Table 1. Continued

(a) Concluded

x , in.	y , in.	z , in.	x , in.	y , in.	z , in.
45.000 ↓	0.000	-2.500	48.200 ↓	0.000	-2.500
	3.500	-2.500		3.500	-2.500
	4.000	-2.366		4.000	-2.366
	4.366	-2.000		4.366	-2.000
	4.500	-1.500		4.500	-1.500
	4.500	1.500		4.500	1.500
	4.366	2.000		4.366	2.000
	4.000	2.366		4.000	2.366
	3.500	2.500		3.500	2.500
	.000	2.500		.000	2.500

Table 1. Continued

(b) Transition section with $\theta = 0^\circ$

x , in.	y , in.	z , in.	x , in.	y , in.	z , in.
49.200	0.000	-2.400	50.200	4.750	0.850
	.250			4.700	1.300
	.500			4.600	1.680
	.750			4.500	1.900
	1.000			4.350	2.050
	1.250			4.200	2.150
	2.500			3.900	2.250
	3.500			3.600	2.300
	3.850	-2.350		2.500	2.300
	4.100	-2.250		1.250	2.300
	4.300	-2.100		1.000	2.270
	4.450	-1.850		.750	2.250
	4.550	-1.500		.500	2.230
	4.600	-1.230		.250	2.220
	4.650	-.750		.000	2.220
	4.650	.750	51.200	0.000	-2.000
	4.600	1.230		.250	-2.030
	4.550	1.500		.500	-2.050
	4.450	1.850		.750	-2.100
	4.300	2.100		1.000	-2.150
	4.100	2.250		1.250	-2.220
	3.850	2.350		2.500	
	3.500	2.400		3.500	
	2.500			4.150	
	1.250			4.200	-2.100
	1.000			4.350	-2.000
	.750			4.550	-1.850
	.500			4.650	-1.650
	.250			4.700	-1.450
	.000			4.800	-.750
50.200	0.000	-2.200		4.800	.750
	.250	-2.220		4.700	1.450
	.500	-2.223		4.650	1.650
	.750	-2.250		4.550	1.850
	1.000	-2.270		4.350	2.000
	1.125	-2.300		4.200	2.100
	2.500	-2.300		4.150	2.200
	3.600	-2.300		3.500	
	3.900	-2.250		2.500	
	4.200	-2.150		1.250	
	4.350	-2.050		1.000	2.150
	4.500	-1.900		.750	2.100
	4.600	-1.680		.500	2.050
	4.700	-1.300		.250	2.030
	4.750	-.850		.000	2.000

Table 1. Continued

(b) Continued

<i>x</i> , in.	<i>y</i> , in.	<i>z</i> , in.	<i>x</i> , in.	<i>y</i> , in.	<i>z</i> , in.
53.200	0.000	-1.600	54.200	4.950	0.500
	.250	-1.650		4.850	1.000
	.500	-1.750		4.750	1.300
	.750	-1.850		4.650	1.550
	1.000	-1.950		4.550	1.700
	1.250	-2.000		4.400	1.850
	2.500			4.200	1.950
	3.500			3.500	
	4.050	↓		2.500	
	4.250	-1.930		1.250	
	4.400	-1.800		1.000	↓
	4.550	-1.630		.750	1.850
	4.700	-1.350		.500	1.580
	4.800	-1.050		.250	1.400
	4.900	-.500		.000	1.400
	4.900	.500	55.200	0.000	-1.200
	4.800	1.050		.250	-1.200
	4.700	1.350		.500	-1.400
	4.550	1.630		.750	-1.730
	4.400	1.800		1.000	-1.900
	4.250	1.930		1.250	
	4.050	2.000		2.500	
	3.500			3.500	
	2.500			4.300	↓
	1.250	↓		4.500	-1.880
	1.000	1.950		4.650	-1.800
	.750	1.850		4.750	-1.650
	.500	1.750		4.900	-1.300
	.250	1.650		4.950	-1.050
	.000	1.600		5.000	-.700
54.200	0.000	-1.400		5.000	.700
	.250	-1.400		4.950	1.050
	.500	-1.580		4.900	1.300
	.750	-1.850		4.750	1.650
	1.000	-1.950		4.650	1.800
	1.250			4.500	1.880
	2.500			4.300	1.900
	3.500			3.500	
	4.200	↓		2.500	
	4.400	-1.850		1.250	
	4.550	-1.700		1.000	↓
	4.650	-1.550		.750	1.730
	4.750	-1.300		.500	1.400
	4.850	-1.000		.250	1.200
	4.950	-.500		.000	1.200

Table 1. Continued

(b) Concluded

<i>x</i> , in.	<i>y</i> , in.	<i>z</i> , in.	<i>x</i> , in.	<i>y</i> , in.	<i>z</i> , in.
56.200	0.000	-0.800	57.820	0.000	-0.800
	.400	-.800		.400	-.800
	.500	-1.200		.500	-1.200
	.750	-1.650		.750	-1.650
	1.000	-1.850		1.000	-1.850
	1.250			1.250	
	2.500			2.500	
	3.500			3.500	
	4.250			4.250	
	4.500			4.500	
	4.650			4.650	
	4.800			4.800	
	4.900			4.900	
	5.000			5.000	
	5.050			5.050	
	5.050			5.050	
	5.000			5.000	
	5.000			5.000	
	5.000			5.000	
	5.000			5.000	
	4.900			4.900	
	4.800			4.800	
	4.650			4.650	
	4.500			4.500	
	4.250			4.250	
	3.500			3.500	
	2.500			2.500	
	1.250			1.250	
	1.000			1.000	
	.750			.750	
	.500			.500	
	.250			.250	
.000	.800			.800	
					.800

Table 1. Continued

(c) Transition section with $\theta = 30^\circ$

x , in.	y , in.	z , in.	x , in.	y , in.	z , in.
48.700	0.000	-2.500	49.200	4.500	0.266
	.452				.718
	.904				1.170
	1.356				1.500
	1.808			4.336	2.000
	2.260			4.000	2.366
	2.712			3.500	2.500
	3.163			3.164	
	3.500			2.712	
	4.000	-2.366		2.260	
	4.366	-2.000		1.808	
	4.500	-1.500		1.356	
		-1.089		.904	
		-.637		.452	
		-.186		.000	
			.266	50.200	0.000
			.718		-.2.376
			1.170		-.2.383
			1.500		-.2.384
			4.336		-.2.395
			2.000		-.2.533
			4.000		-.2.449
			2.366		-.2.434
			3.500		-.2.428
			2.712		-.2.392
			2.260		-.2.223
			1.808		-.1.871
			1.356		-.1.438
			.904		-.1.010
			.452		-.561
			.000		-.126
49.200	0.000	-2.500		4.536	.315
	.452			4.530	.765
	.904			4.535	1.215
	1.356			4.493	1.662
	1.808			4.291	2.061
	2.260			4.007	2.409
	2.712			3.591	2.534
	3.163			3.150	2.445
	3.500			2.701	2.413
	4.000	-2.366		2.251	2.403
	4.366	-2.000		1.801	2.404
	4.500	-1.500		1.350	2.401
		-1.089		.900	2.398
		-.637		.450	2.394
		-.186		.000	2.390

Table 1. Continued

(c) Continued

<i>x</i> , in.	<i>y</i> , in.	<i>z</i> , in.	<i>x</i> , in.	<i>y</i> , in.	<i>z</i> , in.
50.700	0.000	-2.305	51.200	4.604	0.310
	.451	-2.313		4.537	.754
	.903	-2.312		4.545	1.208
	1.349	-2.338		4.496	1.657
	1.753	-2.537		4.274	2.052
	2.190	-2.444		3.999	2.412
	2.631	-2.375		3.594	2.563
	3.083	-2.375		3.164	2.419
	3.532	-2.336		2.723	2.313
	3.944	-2.161		2.270	2.287
	4.218	-1.810		1.816	2.283
	4.344	-1.377		1.362	2.277
	4.507	-.968		.908	2.270
	4.540	-.519		.454	2.260
	4.706	-.109		.000	2.253
	4.556	.316	52.200	0.000	-2.068
	4.533	.766		.461	-2.070
	4.539	1.217		.921	-2.072
	4.495	1.664		1.342	-2.199
	4.281	2.061		1.634	-2.550
	4.000	2.413		2.081	-2.512
	3.588	2.548		2.496	-2.313
	3.153	2.428		2.930	-2.168
	2.708	2.360		3.387	-2.110
	2.257	2.352		3.797	-1.908
	1.805	2.347		4.070	-1.539
	1.354	2.343		4.429	-1.258
	.903	2.336		4.511	-.817
	.451	2.332		4.808	-.496
	.000	2.332		4.935	-.089
51.200	0.000	-2.230		4.723	.319
	.454	-2.236		4.551	.741
	.908	-2.236		4.558	1.202
	1.358	-2.269		4.494	1.655
	1.711	-2.540		4.260	2.051
	2.150	-2.462		3.992	2.426
	2.579	-2.320		3.597	2.597
	3.033	-2.313		3.178	2.408
	3.485	-2.272		2.754	2.228
	3.898	-2.092		2.303	2.140
	4.172	-1.737		1.842	2.124
	4.348	-1.327		1.382	2.119
	4.513	-.928		.921	2.112
	4.595	-.492		.461	2.101
	4.791	-.103		.000	2.092

Table 1. Continued

(c) Continued

<i>x</i> , in.	<i>y</i> , in.	<i>z</i> , in.	<i>x</i> , in.	<i>y</i> , in.	<i>z</i> , in.
53.200	0.000	-1.885	54.200	5.032	0.255
	.471	-1.886		4.778	.667
	.942	-1.893		4.583	1.104
	1.308	-2.138		4.522	1.582
	1.569	-2.529		4.292	2.008
	2.008	-2.567		4.028	2.414
	2.432	-2.362		3.644	2.657
	2.851	-2.147		3.201	2.469
	3.287	-1.971		2.783	2.224
	3.699	-1.752		2.369	1.973
	4.080	-1.476		1.929	1.772
	4.466	-1.213		1.452	1.700
	4.596	-.779		.968	1.687
	4.999	-.537		.484	1.680
	5.089	-.112		.000	1.677
	4.865	.302	55.200	0.000	-1.472
	4.625	.707		.496	-1.474
	4.567	1.169		.972	-1.559
	4.507	1.632		1.231	-1.980
	4.271	2.039		1.467	-2.416
	4.004	2.427		1.843	-2.666
	3.612	2.630		2.292	-2.460
	3.187	2.432		2.729	-2.227
	2.778	2.198		3.165	-1.990
	2.345	2.016		3.602	-1.756
	1.883	1.932		4.038	-1.520
	1.412	1.923		4.442	-1.243
	.942	1.918		4.810	-.941
	.471	1.911		5.243	-.702
	.000	1.910		5.383	-.259
54.200	0.000	-1.695		5.173	.189
	.484	-1.694		4.922	.617
	.968	-1.710		4.666	1.041
	1.277	-2.063		4.523	1.513
	1.521	-2.481		4.294	1.952
	1.937	-2.622		4.026	2.369
	2.374	-2.414		3.653	2.660
	2.801	-2.187		3.200	2.470
	3.229	-1.959		2.775	2.214
	3.655	-1.731		2.356	1.950
	4.079	-1.497		1.934	1.690
	4.467	-1.223		1.482	1.489
	4.731	-.856		.992	1.422
	5.153	-.620		.496	1.412
	5.252	-.176		.000	1.414

Table 1. Continued

(c) Concluded

<i>x</i> , in.	<i>y</i> , in.	<i>z</i> , in.	<i>x</i> , in.	<i>y</i> , in.	<i>z</i> , in.
56.200	0.000	-1.221	57.820	0.000	-1.000
	.505	-1.228		.500	-1.000
	.929	-1.432		.700	-1.100
	1.169	-1.876		1.100	-1.800
	1.405	-2.323		1.350	-2.300
	1.735	-2.679		1.650	-2.620
	2.201	-2.499		1.850	-2.650
	2.647	-2.262		2.500	-2.330
	3.091	-2.021		3.000	-2.050
	3.536	-1.781		3.500	-1.770
	3.980	-1.540		4.000	-1.500
	4.406	-1.272		4.500	-1.200
	4.830	-1.007		5.250	-.800
	5.270	-.759		5.400	-.650
	5.464	-.330		5.500	-.450
	5.255	.128		5.450	-.250
	5.001	.564		5.250	.070
	4.745	1.000		4.700	.950
	4.520	1.452		4.500	1.350
	4.282	1.897		4.200	1.880
	4.012	2.324		3.900	2.400
	3.635	2.628		3.700	2.550
	3.179	2.431		3.350	2.500
	2.750	2.164		2.500	1.950
	2.325	1.891		2.200	1.780
	1.900	1.618		1.800	1.550
	1.469	1.356		1.300	1.250
	1.005	1.159		.700	.900
	.504	1.095		.500	.820
	.000	1.074		.000	.700

Table 1. Continued

(d) Transition section with $\theta = 45^\circ$

x , in.	y , in.	z , in.	x , in.	y , in.	z , in.
48.700	0.000	-2.450	49.200	4.580	0.250
	.500			4.580	.750
	.900			4.550	1.000
	1.350			4.500	1.500
	1.800			4.400	2.000
	2.200			4.000	2.350
	2.700			3.500	2.430
	3.150			3.150	2.430
	3.500	-2.440		2.700	2.420
	4.000	-2.400		2.200	2.400
	4.400	-2.000		1.750	
	4.530	-1.500		1.350	
	4.550	-1.000		.900	
		-.750		.500	
		-.250		.000	
		.250	50.200	0.000	-2.350
		.750		.500	
		1.000		.900	
	4.530	1.400		1.350	
	4.400	1.950		1.750	
	4.000	2.400		2.200	-2.400
	3.500	2.460		2.650	-2.450
	3.150	2.460		3.100	-2.450
	2.700	2.450		3.500	-2.400
	2.200	2.440		4.000	-2.150
	1.750	2.430		4.250	-1.900
	1.350			4.400	-1.650
	.900			4.500	-1.250
	.500			4.580	-1.000
	.000			4.600	-.250
49.200	0.000	-2.430		4.600	.250
	.500			4.580	1.000
	.900			4.500	1.530
	1.350			4.400	1.850
	1.750	-2.450		4.250	2.100
	2.200			4.000	2.330
	2.700			3.500	2.480
	3.150			3.100	2.500
	3.500	-2.430		2.650	2.430
	4.000	-2.300		2.200	2.300
	4.400	-2.000		1.750	
	4.500	-1.500		1.350	
	4.550	-1.000		.900	
	4.550	-.750		.500	
	4.580	-.250		.000	

Table 1. Concluded

(d) Concluded

<i>x</i> , in.	<i>y</i> , in.	<i>z</i> , in.	<i>x</i> , in.	<i>y</i> , in.	<i>z</i> , in.
51.200	0.000	-2.200	54.200	5.030	0.250
	.500			5.000	.650
	.900			4.750	1.000
	1.350			4.500	1.330
	1.750			4.250	1.650
	2.200	-2.300		4.000	1.950
	2.600	-2.350		3.500	2.500
	3.100	-2.350		3.000	2.730
	3.500	-2.250		2.700	2.550
	4.000	-2.070		2.200	2.050
	4.250	-1.850		1.750	1.750
	4.600	-1.500		1.350	1.700
	4.700	-1.230		.900	
	4.830	-.750		.500	
	4.830	-.250		.000	
	4.800	.250	57.820	0.000	-0.950
	4.650	1.000		.500	-.950
	4.500	1.500		.900	-1.200
	4.350	1.800		1.350	-1.700
	4.250	1.980		1.750	-2.100
	4.000	2.250		2.250	-2.630
	3.500	2.500		2.500	-2.750
	3.150	2.550		2.900	-2.550
	2.600	2.380		3.500	-1.950
	2.220	2.230		4.000	-1.450
	1.750	2.200		4.350	-1.080
	1.350			4.450	-1.000
	.900			5.100	-.433
	.500			5.400	.000
	.000			5.500	.150
54.200	0.000	-1.700		5.500	.350
	.500	-1.700		5.400	.530
	.900	-1.700		5.100	.850
	1.400	-1.800		4.700	1.250
	1.750	-2.050		4.350	1.650
	2.250	-2.500		4.000	2.000
	2.750	-2.700		3.500	2.530
	3.050	-2.650		3.000	2.730
	3.500	-2.350		2.700	2.550
	4.000	-1.730		2.200	2.100
	4.250	-1.300		1.750	1.630
	4.450	-1.000		1.350	1.250
	4.650	-.750		.900	.950
	4.870	-.250		.500	.930
	4.980	.000		.000	.930

Table 2. Nozzle Coordinates

(a) Standard flap

$\delta_{v,p} = 0^\circ$		$\delta_{v,p} = 10^\circ$		$\delta_{v,p} = 20^\circ$		$\delta_{v,p} = 30^\circ$	
x , in.	y , in.	x , in.	y , in.	x , in.	y , in.	x , in.	y , in.
Upper flap							
57.82	1.85	57.82	1.85	57.82	1.85	57.82	1.85
58.32	1.73	58.32	1.69	58.32	1.62	58.32	1.55
58.82	1.60	58.82	1.32	58.82	1.37	58.82	1.25
59.32	1.46	59.32	1.29	59.32	1.10	59.32	.92
59.82	1.31	59.82	1.07	59.82	.82	59.82	.57
60.32	1.15	60.32	.84	60.32	.51	60.32	.51
60.82	.98	60.82	.58	60.82	.21	60.72	-.15
61.32	.80	61.05	.45	60.90	.13	61.40	-.73
61.72	.62	61.70	.12	61.56	-.33		
Lower flap							
57.82	1.85	57.82	1.85	57.82	1.85	57.82	1.85
58.32	1.73	58.32	1.82	58.32	1.89	58.32	1.97
58.82	1.60	58.82	1.75	58.82	1.90	58.82	2.07
59.32	1.46	59.32	1.69	59.32	1.91	59.32	2.15
59.82	1.31	59.82	1.60	59.82	1.90	59.82	2.22
60.32	1.15	60.32	1.50	60.32	1.88	60.32	2.28
60.82	.98	60.82	1.39	60.82	1.85	60.82	2.33
61.32	.80	61.27	1.27	61.33	1.78	61.28	2.36
61.72	.62	61.72	1.14	61.73	1.74	61.61	2.37

Table 2. Continued

(b) Long flap

$\delta_{v,p} = 0^\circ$		$\delta_{v,p} = 20^\circ$	
x , in.	y , in.	x , in.	y , in.
Upper flap			
57.82	1.85	57.82	1.85
58.32	1.77	58.32	1.64
58.82	1.68	58.82	1.42
59.32	1.60	59.32	1.20
59.82	1.50	59.82	.96
60.32	1.39	60.32	.72
60.82	1.29	60.82	.47
61.32	1.19	61.32	.24
61.82	1.08	61.82	-.03
62.32	.96	62.32	-.24
62.82	.84	62.82	-.55
63.32	.72	63.32	-.83
63.64	.64	63.43	-.91
Lower flap			
$\delta_{v,p} = 0^\circ$		$\delta_{v,p} = 10^\circ$	
57.82	1.85	57.82	1.85
58.32	1.77	58.32	1.92
58.82	1.68	58.82	1.98
59.32	1.60	59.32	2.04
59.82	1.50	59.82	2.10
60.32	1.39	60.32	2.14
60.82	1.29	60.82	2.19
61.32	1.19	61.32	2.25
61.82	1.08	61.82	2.28
62.32	.96	62.32	2.34
62.82	.84	62.82	2.35
63.32	.72	63.32	2.37
63.64	.64	63.74	2.38

Table 2. Concluded

(c) Sidewall

Standard flap		
<i>x</i> , in.	<i>y</i> , in.	<i>z</i> , in.
57.82	1.85	.50
58.32	1.82	.49
58.82	1.74	.46
59.32	1.63	.41
59.82	1.50	.34
60.32	1.34	.26
60.82	1.17	.18
61.15	1.03	.10

Long flap		
<i>x</i> , in.	<i>y</i> , in.	<i>z</i> , in.
57.82	1.85	.50
58.32	1.80	.50
58.82	1.75	.50
59.32	1.68	.49
59.82	1.62	.46
60.32	1.54	.43
60.82	1.44	.40
61.32	1.34	.34
61.82	1.23	.28
62.32	1.11	.18
62.66	1.03	.10

Table 3. Index to Tabulated Data

Table	θ , deg	$\delta_{v,p,l}$, deg	$\delta_{v,p,r}$, deg	Flap	β , deg
				Static data	
4	0	0	0	0	0
5	30	10	10	10	0
6	45	20	20	20	0
7	0	20	20	20	0
8	30	30	30	30	0
				Standard	
9	0	0	0	0	0
10	10	10	10	10	0
11	20	20	20	20	0
12	30	30	30	30	0
13	-20	20	20	20	0
14	0	0	0	0	0
15	20	20	20	20	0
16	-20	20	20	20	0
17	0	0	0	0	0
18	10	10	10	10	0
19	20	20	20	20	0
20	30	30	30	30	0
21	-20	-20	-20	-20	0
22	20	20	20	20	0
23	-30	30	30	30	0
24	0	20	20	20	0
25	0	0	0	0	0
26	20	20	20	20	0
27	-20	20	20	20	0
28	0	20	20	20	0
29	0	0	0	0	0
30	20	20	20	20	0
31	-20	20	20	20	0
32	0	0	0	0	0
33	0	0	0	0	0
34	0	20	20	20	0
35	30	0	0	0	0
36	30	20	20	20	0
				Long	
				Long	
				Long	

Table 4. Static Aerodynamic Characteristics for Standard Nozzle With $\theta = 0^\circ$ and $\beta = 0^\circ$ (a) $\delta_{v,p,l} = 0^\circ; \delta_{v,p,r} = 0^\circ$

NPR	WP/WI	FJ/FI	FR/FI	DELTAP	DELTAY	CFJ	CFN	CM	CFS	CYAW	CROLL
1.50	1.0020	0.8834	0.8844	2.2270	1.5000	0.0077	0.0003	0.0001	0.0002	0.0000	0.0000
1.99	0.9680	0.9406	0.9407	0.5284	0.7000	0.0140	0.0001	0.0001	0.0002	0.0000	0.0000
2.50	0.9692	0.9684	0.9685	-0.1597	0.3000	0.0205	0.0000	0.0002	0.0001	0.0000	0.0000
3.01	0.9676	0.9773	0.9774	-0.4160	-0.2000	0.0270	-0.0002	0.0003	-0.0001	0.0000	0.0000
3.51	0.9639	0.9866	0.9866	-0.5700	-0.4000	0.0335	-0.0003	0.0002	-0.0002	-0.0001	0.0000
4.01	0.9722	0.9872	0.9873	-0.7608	-0.4000	0.0402	-0.0005	0.0004	-0.0003	-0.0001	0.0000
4.48	0.9699	0.9825	0.9826	-0.8478	-0.3000	0.0460	-0.0006	0.0003	-0.0002	-0.0001	0.0000
5.03	0.9709	0.9801	0.9801	-0.5077	-0.2000	0.0531	-0.0004	0.0004	-0.0002	-0.0001	0.0000
5.48	0.9725	0.9764	0.9765	-0.3807	-0.2000	0.0589	-0.0003	0.0005	-0.0002	-0.0001	0.0000

(b) $\delta_{v,p,l} = 10^\circ; \delta_{v,p,r} = 10^\circ$

NPR	WP/WI	FJ/FI	FR/FI	DELTAP	DELTAY	CFJ	CEN	CM	CFS	CYAW	CROLL
1.51	0.9680	0.8438	0.8640	12.4200	0.3000	0.0071	0.0016	-0.0014	0.0000	0.0000	0.0000
2.01	0.9377	0.9108	0.9402	14.3500	0.1000	0.0132	0.0034	-0.0031	0.0000	0.0000	0.0000
2.49	0.9354	0.9355	0.9521	10.6900	0.1000	0.0189	0.0035	-0.0034	0.0000	0.0000	0.0000
3.01	0.9314	0.9499	0.9698	11.6200	0.0000	0.0251	0.0051	-0.0049	0.0000	0.0000	0.0000
3.51	0.9376	0.9614	0.9833	12.1000	0.1000	0.0315	0.0067	-0.0060	0.0000	0.0000	0.0000
4.01	0.9402	0.9676	0.9878	11.6000	0.6000	0.0378	0.0077	-0.0068	0.0004	0.0000	0.0000
4.50	0.9398	0.9678	0.9867	11.2200	0.6000	0.0437	0.0085	-0.0076	0.0005	0.0001	0.0000
4.99	0.9392	0.9668	0.9842	10.7800	0.6000	0.0498	0.0093	-0.0083	0.0005	0.0001	0.0000
5.49	0.9424	0.9662	0.9832	10.6700	0.5000	0.0562	0.0104	-0.0090	0.0005	0.0001	0.0001

(c) $\delta_{v,p,l} = 20^\circ; \delta_{v,p,r} = 20^\circ$

NPR	WP/WI	FJ/FI	FR/FI	DELTAP	DELTAY	CFJ	CEN	CM	CFS	CYAW	CROLL
1.50	0.9482	0.7955	0.8942	27.1300	-2.0000	0.0061	0.0031	-0.0024	-0.0002	0.0000	0.0000
1.99	0.9437	0.8264	0.9387	28.3100	-1.0000	0.0113	0.0061	-0.0049	-0.0002	0.0000	0.0000
2.48	0.9414	0.8718	0.9667	25.5900	-0.5000	0.0168	0.0080	-0.0068	-0.0001	0.0000	0.0000
3.00	0.9399	0.8855	0.9705	24.1600	-0.3000	0.0223	0.0099	-0.0084	-0.0001	0.0001	0.0001
3.51	0.9395	0.9007	0.9867	24.0900	0.4000	0.0281	0.0124	-0.0102	0.0002	0.0001	0.0000
4.00	0.9404	0.9105	0.9898	23.0900	0.4000	0.0337	0.0142	-0.0118	0.0002	0.0001	0.0001
4.50	0.9416	0.9168	0.9911	22.3300	0.3000	0.0395	0.0159	-0.0133	0.0002	0.0001	0.0001
4.99	0.9413	0.9255	0.9951	21.5600	0.3000	0.0454	0.0176	-0.0148	0.0002	0.0001	0.0000
5.49	0.9423	0.9280	0.9942	21.0200	0.3000	0.0514	0.0193	-0.0161	0.0002	0.0001	0.0000

Table 4. Concluded

(d) $\delta_{v,p,l} = -20^\circ$; $\delta_{v,p,r} = 20^\circ$

NPR	WP/WI	FJ/FI	FR/FI	DELTAP	DELTA Y	CFJ	C FN	CM	CFS	CYAW	CROLL
1.50	0.9566	0.8053	0.8059	2.1590	0.7000	0.0062	0.0002	0.0000	0.0001	0.0000	-0.0002
1.99	0.9425	0.8289	0.8290	0.6637	0.5000	0.0113	0.0001	-0.0001	0.0001	0.0000	-0.0004
2.50	0.9412	0.8681	0.8682	0.0421	0.7000	0.0168	0.0000	0.0000	0.0002	0.0000	-0.0005
3.01	0.9416	0.8852	0.8852	0.5046	0.3000	0.0224	0.0003	0.0000	0.0001	0.0000	-0.0007
3.49	0.9408	0.9025	0.9026	0.9191	0.1000	0.0279	0.0005	0.0000	0.0000	0.0000	-0.0008
4.02	0.9396	0.9110	0.9110	0.4997	-0.2000	0.0339	0.0004	0.0000	-0.0001	0.0000	-0.0009
4.49	0.9406	0.9195	0.9195	0.2770	-0.1000	0.0394	0.0003	0.0001	-0.0001	0.0000	-0.0010
4.98	0.9432	0.9225	0.9226	0.8150	0.0000	0.0452	0.0008	0.0001	0.0000	0.0000	-0.0011

(e) $\delta_{v,p,l} = 30^\circ$; $\delta_{v,p,r} = 30^\circ$

NPR	WP/WI	FJ/FI	FR/FI	DELTAP	DELTA Y	CFJ	C FN	CM	CFS	CYAW	CROLL
1.51	0.8757	0.7292	0.8509	31.0100	0.3000	0.0050	0.0030	-0.0033	0.0000	0.0000	0.0000
2.00	0.9088	0.7185	0.8936	36.4800	0.1000	0.0089	0.0066	-0.0064	0.0000	0.0000	0.0000
2.49	0.9080	0.7530	0.9563	38.0600	0.2000	0.0132	0.0103	-0.0095	0.0000	0.0001	0.0000
2.98	0.9054	0.7914	0.9830	36.3800	0.2000	0.0180	0.0131	-0.0115	0.0001	0.0001	0.0000
3.52	0.9066	0.7876	0.9941	37.6000	0.8000	0.0224	0.0170	-0.0153	0.0003	0.0001	0.0000
4.01	0.9081	0.7929	1.0040	37.8600	0.9000	0.0269	0.0205	-0.0183	0.0004	0.0001	0.0000
4.50	0.9076	0.8123	0.9933	35.1300	0.8000	0.0319	0.0220	-0.0201	0.0005	0.0001	0.0001
4.98	0.9103	0.8286	0.9984	33.9000	0.7000	0.0371	0.0244	-0.0217	0.0004	0.0002	0.0001
5.49	0.9111	0.8420	0.9959	32.2700	0.6000	0.0425	0.0262	-0.0236	0.0004	0.0002	0.0001

Table 5. Static Aerodynamic Characteristics for Standard Nozzle With $\theta = 30^\circ$ and $\beta = 0^\circ$ (a) $\delta_{v,p,l} = 0^\circ; \delta_{v,p,r} = 0^\circ$

NPR	WP/WI	FJ/FI	FR/FI	DELTAP	DELTAY	CFJ	CFN	CM	CFS	CYAW	CROLL
1.49	1.0100	0.8903	0.8917	-3.0940	1.0000	0.0076	-0.0004	0.0000	0.0001	0.0000	0.0000
1.99	0.9717	0.9473	0.9482	-2.4480	0.7000	0.0141	-0.0006	0.0001	0.0002	0.0000	0.0000
2.49	0.9660	0.9665	0.9671	-1.8760	0.3000	0.0203	-0.0007	0.0001	0.0001	0.0000	0.0000
2.98	0.9663	0.9825	0.9827	-1.0370	0.0000	0.0267	-0.0005	0.0002	0.0000	0.0000	0.0000
3.49	0.9682	0.9856	0.9857	-0.6090	-0.1000	0.0333	-0.0003	0.0002	0.0000	0.0000	0.0000
4.02	0.9680	0.9853	0.9854	-0.7723	-0.3000	0.0400	-0.0005	0.0003	-0.0002	0.0000	0.0000
4.50	0.9654	0.9838	0.9839	-0.8613	-0.3000	0.0461	-0.0007	0.0003	-0.0003	0.0000	0.0000
4.97	0.9702	0.9797	0.9798	-0.8939	-0.3000	0.0523	-0.0008	0.0004	-0.0003	0.0000	0.0000
5.41	0.9649	0.9804	0.9806	-0.9354	-0.2000	0.0578	-0.0009	0.0004	-0.0002	0.0000	0.0000

(b) $\delta_{v,p,l} = 10^\circ; \delta_{v,p,r} = 10^\circ$

NPR	WP/WI	FJ/FI	FR/FI	DELTAP	DELTAY	CFJ	CFN	CM	CFS	CYAW	CROLL
1.51	0.9844	0.8427	0.8572	10.5500	0.4000	0.0072	0.0013	-0.0011	0.0000	0.0000	0.0000
1.99	0.9487	0.9083	0.9270	11.5300	0.1000	0.0130	0.0026	-0.0025	0.0000	-0.0001	0.0000
2.49	0.9477	0.9359	0.9488	9.4830	-0.1000	0.0191	0.0032	-0.0028	0.0000	-0.0001	0.0000
3.00	0.9412	0.9494	0.9638	9.9170	-0.3000	0.0251	0.0043	-0.0042	-0.0001	0.0000	0.0000
3.48	0.9464	0.9614	0.9768	10.1800	-0.2000	0.0313	0.0056	-0.0051	-0.0001	0.0000	0.0000
4.00	0.9430	0.9686	0.9839	10.1100	-0.1000	0.0376	0.0066	-0.0058	-0.0001	0.0000	0.0000
4.52	0.9463	0.9708	0.9840	9.4120	0.1000	0.0442	0.0072	-0.0065	0.0001	0.0000	0.0000
4.96	0.9462	0.9683	0.9817	9.4650	0.2000	0.0496	0.0081	-0.0071	0.0002	0.0000	0.0000
5.50	0.9431	0.9720	0.9847	9.2150	0.4000	0.0564	0.0090	-0.0077	0.0004	0.0000	0.0000

(c) $\delta_{v,p,l} = 20^\circ; \delta_{v,p,r} = 20^\circ$

NPR	WP/WI	FJ/FI	FR/FI	DELTAP	DELTAY	CFJ	CFN	CM	CFS	CYAW	CROLL
1.50	0.9424	0.7923	0.8518	21.5300	0.6000	0.0061	0.0024	-0.0021	0.0001	0.0000	0.0000
1.99	0.9450	0.8335	0.9087	23.4800	0.2000	0.0114	0.0049	-0.0043	0.0000	0.0000	0.0000
2.50	0.9355	0.8702	0.9422	22.5500	0.2000	0.0168	0.0069	-0.0060	0.0001	0.0000	0.0000
3.01	0.9417	0.8919	0.9484	19.8700	0.2000	0.0226	0.0081	-0.0074	0.0001	0.0000	0.0000
3.50	0.9390	0.9054	0.9679	20.6900	0.2000	0.0281	0.0105	-0.0089	0.0001	0.0000	0.0000
4.02	0.9411	0.9165	0.9747	19.8900	0.7000	0.0341	0.0122	-0.0104	0.0004	0.0000	0.0000
4.50	0.9421	0.9221	0.9777	19.3900	0.8000	0.0398	0.0138	-0.0117	0.0005	0.0000	0.0000
4.99	0.9418	0.9261	0.9759	18.3700	0.7000	0.0454	0.0148	-0.0128	0.0006	0.0000	0.0000
5.50	0.9410	0.9308	0.9793	18.1000	0.6000	0.0515	0.0165	-0.0140	0.0005	0.0000	0.0000

Table 5. Continued

(d) $\delta_{v,p,l} = -20^\circ$; $\delta_{v,p,r} = 20^\circ$

NPR	WP/WI	FJ/FI	FR/FI	DELTAP	DELTAY	CFJ	CFN	CM	CFS	CYAW	CROLL
1.51	0.9462	0.8128	0.8398	-1.9250	14.5000	0.0064	-0.0002	0.0000	0.0017	-0.0006	-0.0002
2.01	0.9434	0.8369	0.8752	0.9344	17.0000	0.0116	0.0002	-0.0001	0.0035	-0.0012	-0.0003
2.49	0.9410	0.8857	0.9217	0.0939	16.1000	0.0171	0.0001	0.0000	0.0049	-0.0016	-0.0004
2.98	0.9383	0.8969	0.9319	-0.2796	15.8000	0.0223	0.0000	0.0001	0.0063	-0.0019	-0.0005
3.50	0.9398	0.9155	0.9477	0.9420	14.9000	0.0284	0.0006	0.0000	0.0076	-0.0023	-0.0006
3.99	0.9399	0.9229	0.9536	0.5981	14.6000	0.0340	0.0006	0.0000	0.0088	-0.0027	-0.0008
4.49	0.9422	0.9300	0.9578	0.3749	13.8000	0.0399	0.0005	0.0000	0.0098	-0.0031	-0.0008
5.01	0.9413	0.9353	0.9618	0.3807	13.5000	0.0461	0.0006	0.0000	0.0111	-0.0034	-0.0009
5.49	0.9421	0.9388	0.9632	0.7157	12.9000	0.0518	0.0011	0.0001	0.0119	-0.0037	-0.0010

(e) $\delta_{v,p,l} = -20^\circ$; $\delta_{v,p,r} = -20^\circ$

NPR	WP/WI	FJ/FI	FR/FI	DELTAP	DELTAY	CFJ	CFN	CM	CFS	CYAW	CROLL
1.50	0.9488	0.7845	0.8503	-22.6900	-0.3000	0.0061	-0.0025	0.0023	0.0000	0.0000	0.0000
2.00	0.9404	0.8100	0.8862	-23.9300	-0.4000	0.0111	-0.0049	0.0044	-0.0001	0.0000	0.0000
2.50	0.9392	0.8628	0.9380	-23.1000	0.1000	0.0167	-0.0071	0.0062	0.0000	-0.0001	-0.0001
2.99	0.9388	0.8791	0.9536	-22.7800	0.9000	0.0220	-0.0091	0.0078	0.0004	-0.0001	-0.0001
3.49	0.9377	0.8997	0.9653	-21.2500	0.1000	0.0278	-0.0106	0.0094	0.0001	0.0000	-0.0001
3.98	0.9377	0.9087	0.9729	-20.9300	0.1000	0.0334	-0.0125	0.0109	0.0000	-0.0001	-0.0001
4.47	0.9387	0.9180	0.9762	-19.8800	0.3000	0.0391	-0.0138	0.0122	0.0002	-0.0001	-0.0001
4.99	0.9365	0.9259	0.9833	-19.6800	0.2000	0.0452	-0.0158	0.0136	0.0001	-0.0001	-0.0001

(f) $\delta_{v,p,l} = 0^\circ$; $\delta_{v,p,r} = 20^\circ$

NPR	WP/WI	FJ/FI	FR/FI	DELTAP	DELTAY	CFJ	CFN	CM	CFS	CYAW	CROLL
1.51	0.9863	0.8463	0.8673	9.2760	8.7000	0.0072	0.0012	-0.0012	0.0011	-0.0003	-0.0001
2.03	0.9462	0.8980	0.9317	12.4800	9.4000	0.0131	0.0029	-0.0024	0.0022	-0.0006	-0.0002
2.52	0.9538	0.9244	0.9538	11.3700	8.8000	0.0190	0.0038	-0.0033	0.0029	-0.0008	-0.0002
3.01	0.9519	0.9425	0.9676	10.4600	8.1000	0.0249	0.0046	-0.0039	0.0035	-0.0010	-0.0003
3.50	0.9515	0.9527	0.9759	9.8990	7.8000	0.0309	0.0054	-0.0047	0.0043	-0.0012	-0.0003
4.00	0.9523	0.9578	0.9797	9.7160	7.4000	0.0371	0.0064	-0.0054	0.0048	-0.0013	-0.0004
4.52	0.9537	0.9614	0.9818	9.3840	7.1000	0.0435	0.0072	-0.0060	0.0054	-0.0015	-0.0004
5.03	0.9549	0.9604	0.9796	9.1010	6.9000	0.0498	0.0080	-0.0066	0.0060	-0.0017	-0.0005
5.49	0.9537	0.9612	0.9801	9.0990	6.8000	0.0555	0.0089	-0.0072	0.0066	-0.0018	-0.0006

Table 5. Concluded

(g) $\delta_{v,p,l} = 30^\circ$; $\delta_{v,p,r} = 30^\circ$

NPR	WP/WI	FJ/FI	FR/FI	DELTAP	DELTAY	CFJ	CFN	CM	CFS	CYAW	CROLL
1.50	0.8859	0.7192	0.8458	31.7500	0.4000	0.0049	0.0030	-0.0028	0.0000	0.0000	0.0000
2.03	0.9164	0.7190	0.8631	33.5900	0.3000	0.0093	0.0061	-0.0057	0.0000	0.0000	0.0000
2.50	0.9104	0.7545	0.9113	34.1000	0.8000	0.0134	0.0090	-0.0082	0.0002	0.0000	0.0000
2.98	0.9117	0.7943	0.9287	31.1900	1.4000	0.0181	0.0110	-0.0100	0.0005	0.0000	0.0000
3.47	0.9110	0.7902	0.9490	33.6100	1.2000	0.0222	0.0147	-0.0129	0.0005	0.0000	0.0000
3.98	0.9110	0.7970	0.9552	33.4400	1.0000	0.0269	0.0177	-0.0156	0.0005	0.0001	0.0000
4.50	0.9118	0.8171	0.9573	31.3800	1.2000	0.0322	0.0196	-0.0173	0.0006	0.0001	0.0000
5.03	0.9104	0.8359	0.9618	29.6300	1.3000	0.0378	0.0214	-0.0188	0.0009	0.0001	0.0000
5.53	0.9109	0.8493	0.9654	28.3800	1.2000	0.0432	0.0233	-0.0203	0.0009	0.0001	0.0000

(h) $\delta_{v,p,l} = -30^\circ$; $\delta_{v,p,r} = 30^\circ$

NPR	WP/WI	FJ/FI	FR/FI	DELTAP	DELTAY	CFJ	CFN	CM	CFS	CYAW	CROLL
1.55	0.8838	0.7413	0.7941	-3.8830	20.7000	0.0055	-0.0004	-0.0001	0.0021	-0.0008	-0.0002
2.00	0.9016	0.7193	0.8026	1.5980	26.3000	0.0089	0.0003	-0.0001	0.0044	-0.0014	-0.0004
2.52	0.9000	0.7632	0.8514	0.4118	26.3000	0.0135	0.0002	-0.0001	0.0067	-0.0021	-0.0006
3.00	0.9088	0.8029	0.8813	0.0160	24.4000	0.0185	0.0001	-0.0001	0.0084	-0.0026	-0.0007
3.49	0.9085	0.7996	0.8808	0.4005	24.8000	0.0226	0.0003	0.0000	0.0104	-0.0034	-0.0009
3.98	0.9074	0.8085	0.8894	0.9224	24.6000	0.0271	0.0007	-0.0001	0.0124	-0.0040	-0.0011
4.50	0.9084	0.8257	0.8972	0.6791	23.0000	0.0324	0.0007	0.0000	0.0138	-0.0045	-0.0012
5.01	0.9110	0.8454	0.9092	0.2683	21.6000	0.0381	0.0006	0.0000	0.0151	-0.0049	-0.0014
5.51	0.9081	0.8576	0.9166	0.1045	20.7000	0.0433	0.0006	0.0001	0.0163	-0.0053	-0.0015

Table 6. Static Aerodynamic Characteristics for Standard Nozzle With $\theta = 45^\circ$ and $\beta = 0^\circ$

(a) $\delta_{v,p,l} = 0^\circ$; $\delta_{v,p,r} = 0^\circ$

NPR	WP/WI	FJ/FI	FR/FI	DELTAP	DELTAY	CFJ	CFN	CM	CFS	CYAW	CROLL
1.51	1.0070	0.8998	0.9008	-2.6860	-0.2000	0.0080	-0.0004	0.0000	0.0000	0.0000	0.0000
2.04	0.9755	0.9522	0.9528	-2.0200	-0.1000	0.0149	-0.0005	0.0001	0.0000	0.0000	0.0000
2.49	0.9714	0.9681	0.9687	-1.8860	-0.2000	0.0205	-0.0007	0.0002	-0.0001	0.0000	0.0000
2.97	0.9707	0.9806	0.9812	-1.8170	-0.5000	0.0268	-0.0008	0.0003	-0.0003	0.0000	0.0000
3.47	0.9706	0.9855	0.9859	-1.6810	-0.2000	0.0333	-0.0010	0.0003	-0.0001	0.0000	0.0000
3.99	0.9711	0.9848	0.9851	-1.2160	-0.3000	0.0399	-0.0008	0.0004	-0.0002	0.0000	0.0000
4.54	0.9705	0.9808	0.9809	-0.9528	-0.2000	0.0468	-0.0008	0.0004	-0.0002	0.0000	0.0000
4.99	0.9718	0.9781	0.9783	-0.9064	-0.1000	0.0526	-0.0009	0.0005	-0.0001	0.0000	0.0000
5.49	0.9709	0.9765	0.9766	-0.8768	-0.2000	0.0591	-0.0009	0.0005	-0.0002	0.0000	0.0000

(b) $\delta_{v,p,l} = 20^\circ$; $\delta_{v,p,r} = 20^\circ$

NPR	WP/WI	FJ/FI	FR/FI	DELTAP	DELTAY	CFJ	CFN	CM	CFS	CYAW	CROLL
1.51	0.9435	0.8078	0.8447	17.0100	-0.2000	0.0064	0.0019	-0.0018	0.0000	0.0000	0.0000
2.01	0.9349	0.8400	0.8943	20.0600	0.1000	0.0116	0.0042	-0.0036	0.0000	-0.0001	0.0000
2.53	0.9385	0.8771	0.9277	19.0000	0.1000	0.0174	0.0060	-0.0051	0.0000	-0.0001	0.0000
3.00	0.9383	0.8921	0.9345	17.3200	0.0000	0.0225	0.0070	-0.0062	0.0000	0.0000	0.0000
3.50	0.9397	0.9087	0.9509	17.1000	1.0000	0.0283	0.0086	-0.0074	0.0005	-0.0001	0.0000
3.99	0.9396	0.9193	0.9566	16.0300	0.7000	0.0341	0.0097	-0.0086	0.0004	-0.0001	0.0000
4.53	0.9423	0.9257	0.9616	15.6900	0.7000	0.0404	0.0112	-0.0096	0.0005	-0.0001	0.0001
5.04	0.9430	0.9301	0.9621	14.8100	0.7000	0.0465	0.0121	-0.0106	0.0005	-0.0001	0.0000
5.52	0.9417	0.9345	0.9670	14.8900	0.9000	0.0522	0.0136	-0.0115	0.0008	-0.0001	0.0001

(c) $\delta_{v,p,l} = -20^\circ$; $\delta_{v,p,r} = 20^\circ$

NPR	WP/WI	FJ/FI	FR/FI	DELTAP	DELTAY	CFJ	CFN	CM	CFS	CYAW	CROLL
1.49	0.9474	0.7966	0.8419	-2.3240	18.8000	0.0061	-0.0002	-0.0001	0.0021	-0.0008	-0.0001
2.00	0.9343	0.8384	0.9149	0.9136	23.6000	0.0114	0.0002	-0.0001	0.0050	-0.0016	-0.0002
2.52	0.9407	0.8897	0.9612	0.0109	22.2000	0.0175	0.0001	0.0000	0.0072	-0.0023	-0.0003
2.99	0.9403	0.8985	0.9652	-0.5463	21.4000	0.0226	-0.0001	0.0003	0.0089	-0.0029	-0.0004
3.49	0.9388	0.9163	0.9732	-0.1867	19.7000	0.0284	0.0001	0.0000	0.0102	-0.0034	-0.0005
3.98	0.9390	0.9271	0.9806	0.5957	19.0000	0.0342	0.0006	0.0000	0.0118	-0.0039	-0.0006
4.49	0.9431	0.9328	0.9823	0.2662	18.3000	0.0403	0.0005	0.0001	0.0133	-0.0044	-0.0006
5.02	0.9434	0.9375	0.9828	0.0357	17.5000	0.0467	0.0004	0.0001	0.0147	-0.0049	-0.0007
5.52	0.9417	0.9408	0.9832	0.1018	16.9000	0.0525	0.0006	0.0000	0.0159	-0.0054	-0.0008

Table 6. Concluded

(d) $\delta_{v,p,l} = 0^\circ$; $\delta_{v,p,r} = -20^\circ$

NPR	WP/WI	FJ/FI	FR/FI	DELTAP	DELTAY	CFJ	CFN	CM	CFS	CYAW	CROLL
1.55	0.9965	0.8621	0.8865	9.6620	9.6000	0.0079	0.0013	-0.0012	0.0013	-0.0005	-0.0001
2.03	0.9454	0.9030	0.9378	9.4640	12.7000	0.0131	0.0022	-0.0020	0.0030	-0.0009	-0.0001
2.50	0.9550	0.9239	0.9556	9.0480	11.9000	0.0188	0.0030	-0.0027	0.0040	-0.0012	-0.0002
2.98	0.9522	0.9420	0.9711	8.6880	11.2000	0.0245	0.0038	-0.0032	0.0049	-0.0014	-0.0002
3.48	0.9509	0.9539	0.9800	8.4990	10.3000	0.0307	0.0046	-0.0038	0.0056	-0.0017	-0.0002
3.98	0.9535	0.9595	0.9849	8.1930	10.3000	0.0369	0.0053	-0.0044	0.0067	-0.0020	-0.0003
4.50	0.9560	0.9652	0.9886	7.9160	9.8000	0.0436	0.0061	-0.0049	0.0075	-0.0022	-0.0003
5.03	0.9559	0.9644	0.9861	7.7600	9.3000	0.0501	0.0069	-0.0054	0.0082	-0.0025	-0.0004
5.50	0.9526	0.9671	0.9873	7.2740	9.1000	0.0559	0.0072	-0.0059	0.0090	-0.0027	-0.0004

Table 7. Static Aerodynamic Characteristics for Long-Flap Nozzle With $\theta = 0^\circ$ and $\beta = 0^\circ$

(a) $\delta_{v,p,l} = 0^\circ$; $\delta_{v,p,r} = 0^\circ$

NPR	WP/WI	FJ/FI	FR/FI	DELTAP	DELTAY	CFJ	CFN	CM	CFS	CYAW	CROLL
1.51	1.0220	0.9202	0.9216	-3.0680	0.6000	0.0082	-0.0004	0.0000	0.0001	0.0000	0.0000
2.01	0.9818	0.9547	0.9552	-1.9160	0.4000	0.0145	-0.0005	0.0002	0.0001	0.0000	0.0000
2.51	0.9808	0.9716	0.9716	-0.6839	0.2000	0.0208	-0.0002	0.0002	0.0001	0.0000	0.0000
3.01	0.9795	0.9793	0.9794	-0.4858	0.7000	0.0272	-0.0002	0.0003	0.0003	-0.0001	0.0000
3.51	0.9813	0.9790	0.9792	-0.6734	0.9000	0.0336	-0.0004	0.0003	0.0006	-0.0001	0.0000
4.00	0.9834	0.9775	0.9777	-0.7578	0.8000	0.0399	-0.0005	0.0004	0.0006	-0.0001	0.0000
4.51	0.9842	0.9729	0.9730	-0.1052	0.7000	0.0462	0.0000	0.0005	0.0006	-0.0001	0.0000
5.01	0.9858	0.9689	0.9690	-0.1049	0.6000	0.0527	-0.0001	0.0005	0.0006	-0.0001	0.0001
5.50	0.9878	0.9646	0.9646	-0.2738	0.7000	0.0590	-0.0002	0.0006	0.0007	-0.0001	0.0001

(b) $\delta_{v,p,l} = 20^\circ$; $\delta_{v,p,r} = 20^\circ$

NPR	WP/WI	FJ/FI	FR/FI	DELTAP	DELTAY	CFJ	CFN	CM	CFS	CYAW	CROLL
1.50	1.0120	0.8496	0.9052	20.1700	0.3000	0.0068	0.0025	-0.0025	0.0000	0.0000	0.0000
1.99	0.9676	0.8759	0.9357	20.6000	0.0000	0.0119	0.0044	-0.0041	0.0000	0.0000	0.0000
2.49	0.9704	0.9138	0.9692	19.4600	0.3000	0.0176	0.0062	-0.0054	0.0001	0.0000	0.0000
2.99	0.9737	0.8968	0.9707	22.4700	1.2000	0.0225	0.0092	-0.0087	0.0005	0.0001	0.0000
3.51	0.9734	0.9025	0.9835	23.4000	0.9000	0.0281	0.0120	-0.0109	0.0004	0.0001	0.0000
4.01	0.9739	0.9041	0.9872	23.6600	0.7000	0.0336	0.0145	-0.0128	0.0004	0.0001	0.0000
4.52	0.9783	0.9038	0.9818	22.9800	0.8000	0.0393	0.0163	-0.0146	0.0005	0.0001	0.0000
4.99	0.9766	0.9036	0.9795	22.6900	0.8000	0.0444	0.0182	-0.0161	0.0006	0.0001	0.0000
5.50	0.9777	0.8822	0.9560	22.6500	0.9000	0.0489	0.0200	-0.0177	0.0007	0.0001	0.0000

Table 8. Static Aerodynamic Characteristics for Long-Flap Nozzle With $\theta = 30^\circ$ and $\beta = 0^\circ$ (a) $\delta_{v,p,l} = 0^\circ$; $\delta_{v,p,r} = 0^\circ$

NPR	WP/WI	FJ/FI	FR/FI	DELTAP	DELTAY	CFJ	CFN	CM	CFS	CYAW	CROLL
1.52	1.0220	0.9252	0.9269	-3.0200	1.6000	0.0085	-0.0004	0.0000	0.0002	0.0000	0.0000
1.95	0.9793	0.9558	0.9568	-2.5040	0.9000	0.0139	-0.0006	0.0001	0.0002	0.0000	0.0000
2.53	0.9750	0.9630	0.9636	1.8200	-0.9000	0.0208	0.0007	0.0000	-0.0003	0.0000	0.0001
2.99	0.9797	0.9751	0.9752	-0.0574	-0.5000	0.0269	0.0000	0.0001	-0.0003	-0.0001	0.0001
3.47	0.9785	0.9743	0.9745	1.0290	-0.7000	0.0329	0.0006	0.0001	-0.0004	-0.0001	0.0001
3.99	0.9792	0.9793	0.9793	0.2953	-0.4000	0.0397	0.0002	0.0002	-0.0003	-0.0001	0.0001
4.49	0.9802	0.9743	0.9743	0.1742	-0.3000	0.0460	0.0002	0.0002	-0.0003	-0.0001	0.0001
4.98	0.9823	0.9706	0.9706	-0.0227	-0.3000	0.0523	0.0000	0.0002	-0.0002	-0.0001	0.0001
5.49	0.9812	0.9706	0.9707	-1.0190	0.1000	0.0590	-0.0010	0.0003	0.0001	-0.0001	0.0000

(b) $\delta_{v,p,l} = 20^\circ$; $\delta_{v,p,r} = 20^\circ$

NPR	WP/WI	FJ/FI	FR/FI	DELTAP	DELTAY	CFJ	CFN	CM	CFS	CYAW	CROLL
1.49	1.0030	0.8614	0.8877	13.9800	-0.1000	0.0067	0.0017	-0.0020	0.0000	0.0000	0.0000
2.00	0.9700	0.9022	0.9394	16.1900	0.0000	0.0123	0.0036	-0.0037	0.0000	0.0000	0.0000
2.48	0.9647	0.9209	0.9615	16.7100	-0.1000	0.0175	0.0052	-0.0047	0.0000	-0.0001	0.0000
2.99	0.9680	0.9060	0.9638	19.9300	0.2000	0.0226	0.0081	-0.0075	0.0001	0.0000	0.0000
3.51	0.9696	0.9104	0.9714	20.4200	0.1000	0.0282	0.0104	-0.0095	0.0001	0.0000	0.0000
3.99	0.9660	0.9130	0.9705	19.8200	0.1000	0.0333	0.0118	-0.0109	0.0001	0.0000	0.0000
4.50	0.9700	0.9138	0.9725	19.9900	0.2000	0.0392	0.0140	-0.0124	0.0001	0.0000	0.0000
5.01	0.9690	0.9116	0.9659	19.2900	0.3000	0.0446	0.0153	-0.0138	0.0003	0.0001	0.0001

Table 9. Aerodynamic Characteristics for Standard Nozzle With $\theta = 0^\circ$,
 $\delta_{v,p,l} = 0^\circ$, $\delta_{v,p,r} = 0^\circ$, and $\beta = 0^\circ$

(a) Longitudinal characteristics

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
1.199	0.02	0.86	-0.0021	0.0220	0.0000	-0.0021	0.0220	0.0000
1.201	0.02	2.00	-0.0029	0.0054	0.0008	-0.0029	0.0193	0.0008
1.202	0.02	3.21	-0.0032	-0.0084	0.0011	-0.0032	0.0209	0.0011
1.202	0.02	4.03	-0.0036	-0.0194	0.0012	-0.0036	0.0202	0.0012
1.201	0.03	5.51	-0.0060	-0.0395	0.0017	-0.0060	0.0191	0.0017
1.200	0.02	6.20	-0.0062	-0.0491	0.0017	-0.0062	0.0183	0.0017
1.201	0.03	7.32	-0.0065	-0.0642	0.0022	-0.0066	0.0174	0.0022
1.200	0.04	7.99	-0.0061	-0.0731	0.0022	-0.0061	0.0172	0.0022
0.901	0.03	1.05	0.0034	0.0094	-0.0053	0.0034	0.0094	-0.0053
0.902	0.04	2.01	-0.0011	-0.0165	-0.0010	-0.0011	0.0085	-0.0010
0.900	0.04	3.19	-0.0020	-0.0437	0.0001	-0.0020	0.0081	0.0001
0.900	0.04	4.01	-0.0027	-0.0622	0.0006	-0.0027	0.0083	0.0006
0.901	0.04	5.01	-0.0032	-0.0843	0.0010	-0.0032	0.0085	0.0010
0.899	0.04	5.99	-0.0036	-0.1073	0.0013	-0.0037	0.0082	0.0013
0.901	0.02	6.98	-0.0044	-0.1296	0.0015	-0.0044	0.0077	0.0015
0.901	0.00	1.06	0.0010	0.0092	-0.0047	0.0010	0.0092	-0.0047
0.900	4.02	1.04	0.0056	0.0109	-0.0072	0.0056	0.0109	-0.0072
0.900	7.99	1.03	0.0097	0.0137	-0.0097	0.0097	0.0137	-0.0097
0.901	12.04	1.02	0.0159	0.0178	-0.0129	0.0159	0.0178	-0.0129
0.898	0.04	5.99	-0.0038	-0.1076	0.0014	-0.0038	0.0080	0.0014
0.899	4.02	5.97	0.0064	-0.1058	-0.0002	-0.0017	0.0090	-0.0002
0.900	8.01	5.99	0.0193	-0.1033	-0.0028	0.0032	0.0108	-0.0028
0.900	12.02	5.97	0.0331	-0.0990	-0.0050	0.0091	0.0134	-0.0050
0.799	0.02	1.06	-0.0058	0.0064	0.0008	-0.0058	0.0064	0.0008
0.801	0.03	1.99	-0.0045	-0.0254	0.0007	-0.0045	0.0058	0.0007
0.802	0.04	3.20	-0.0053	-0.0596	0.0011	-0.0053	0.0062	0.0011
0.803	0.04	4.48	-0.0040	-0.0953	0.0015	-0.0040	0.0066	0.0015
0.803	0.03	5.49	-0.0044	-0.1245	0.0017	-0.0044	0.0063	0.0017
0.802	0.03	6.53	-0.0051	-0.1542	0.0018	-0.0052	0.0061	0.0018
0.599	0.02	1.04	-0.0055	0.0056	0.0014	-0.0055	0.0056	0.0014
0.601	0.04	2.01	-0.0072	-0.0497	0.0017	-0.0072	0.0067	0.0017
0.600	0.02	3.18	-0.0052	-0.1100	0.0021	-0.0053	0.0065	0.0021
0.600	0.04	4.00	-0.0058	-0.1518	0.0026	-0.0059	0.0062	0.0026
0.600	0.04	4.82	-0.0063	-0.1936	0.0031	-0.0065	0.0063	0.0031
0.600	0.05	5.49	-0.0066	-0.2272	0.0030	-0.0068	0.0066	0.0030
0.600	0.04	6.21	-0.0048	-0.2638	0.0035	-0.0050	0.0066	0.0035
0.600	0.00	1.04	-0.0057	0.0059	0.0012	-0.0057	0.0059	0.0012
0.600	4.03	1.03	-0.0051	0.0062	0.0008	-0.0051	0.0062	0.0008
0.598	8.02	1.03	0.0019	0.0079	-0.0023	0.0019	0.0079	-0.0023
0.598	12.00	1.02	0.0108	0.0104	-0.0065	0.0108	0.0104	-0.0065
0.600	0.03	4.76	-0.0065	-0.1896	0.0031	-0.0066	0.0070	0.0031
0.599	4.03	4.80	0.0113	-0.1923	0.0014	-0.0027	0.0063	0.0014
0.599	8.02	4.81	0.0331	-0.1905	-0.0022	0.0052	0.0075	-0.0022
0.599	12.01	4.83	0.0551	-0.1865	-0.0070	0.0133	0.0101	-0.0070

Table 9. Continued

(a) Concluded

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
0.202	0.00	1.00	-0.0009	-0.0008	-0.0043	-0.0009	-0.0008	-0.0043
0.203	0.01	1.52	-0.0181	-0.2821	-0.0005	-0.0182	-0.0017	-0.0005
0.201	0.01	2.01	-0.0247	-0.4983	0.0035	-0.0248	0.0077	0.0035
0.201	0.02	2.59	-0.0281	-0.7553	0.0073	-0.0284	0.0124	0.0073
0.201	0.03	3.19	-0.0119	-1.0250	0.0129	-0.0124	0.0132	0.0129
0.202	0.04	4.01	-0.0192	-1.3810	0.0166	-0.0202	0.0197	0.0166
0.203	0.03	4.99	-0.0013	-1.8070	0.0199	-0.0024	0.0225	0.0199
0.201	0.01	1.01	-0.0017	-0.0002	-0.0006	-0.0017	-0.0002	-0.0006
0.202	4.04	1.00	-0.0029	0.0026	0.0006	-0.0029	0.0026	0.0006
0.202	8.01	1.00	-0.0023	0.0005	-0.0034	-0.0023	0.0005	-0.0034
0.202	12.02	1.00	0.0113	0.0033	-0.0094	0.0113	0.0033	-0.0094
0.202	14.52	1.00	0.0214	0.0063	-0.0135	0.0214	0.0063	-0.0135
0.202	0.04	3.20	-0.0135	-1.0200	0.0131	-0.0142	0.0171	0.0131
0.202	4.04	3.19	0.0591	-1.0150	0.0119	-0.0136	0.0117	0.0119
0.202	8.02	3.19	0.1304	-1.0100	0.0063	-0.0133	0.0099	0.0063
0.203	12.04	3.19	0.2248	-0.9828	-0.0005	0.0117	0.0168	-0.0005
0.203	14.53	3.19	0.2649	-0.9747	-0.0014	0.0085	0.0150	-0.0014

Table 9. Continued

(b) Lateral characteristics

MACH	ALPHA	NPR	CR	CN	CY	CRA	CNA	CYA
1.199	0.02	0.86	-0.0001	0.0003	0.0003	-0.0001	0.0003	0.0003
1.201	0.02	2.00	-0.0001	0.0003	0.0001	-0.0001	0.0003	0.0001
1.202	0.02	3.21	-0.0001	0.0003	0.0002	-0.0001	0.0003	0.0002
1.202	0.02	4.03	0.0000	0.0002	0.0013	0.0000	0.0002	0.0013
1.201	0.03	5.51	0.0000	0.0001	0.0015	0.0000	0.0001	0.0015
1.200	0.02	6.20	0.0000	0.0001	0.0016	0.0000	0.0001	0.0016
1.201	0.03	7.32	0.0000	0.0001	0.0017	0.0000	0.0001	0.0017
1.200	0.04	7.99	0.0000	0.0001	0.0018	0.0000	0.0001	0.0018
0.901	0.03	1.05	-0.0002	0.0002	-0.0011	-0.0002	0.0002	-0.0011
0.902	0.04	2.01	-0.0001	0.0002	0.0004	-0.0001	0.0002	0.0004
0.900	0.04	3.19	0.0000	0.0001	0.0003	0.0000	0.0001	0.0003
0.900	0.04	4.01	0.0000	0.0001	0.0009	0.0000	0.0001	0.0009
0.901	0.04	5.01	0.0001	0.0001	0.0014	0.0001	0.0001	0.0014
0.899	0.04	5.99	0.0001	0.0001	0.0013	0.0001	0.0001	0.0013
0.901	0.02	6.98	0.0001	0.0001	0.0015	0.0001	0.0001	0.0015
0.901	0.00	1.06	-0.0001	0.0002	-0.0002	-0.0001	0.0002	-0.0002
0.900	4.02	1.04	0.0000	0.0002	0.0001	0.0000	0.0002	0.0001
0.900	7.99	1.03	0.0000	0.0002	-0.0002	0.0000	0.0002	-0.0002
0.901	12.04	1.02	0.0000	0.0002	-0.0006	0.0000	0.0002	-0.0006
0.898	0.04	5.99	0.0001	0.0001	0.0014	0.0001	0.0001	0.0014
0.899	4.02	5.97	0.0001	0.0000	0.0015	0.0001	0.0000	0.0015
0.900	8.01	5.99	0.0001	0.0001	0.0015	0.0001	0.0001	0.0015
0.900	12.02	5.97	0.0001	0.0001	0.0010	0.0001	0.0001	0.0010
0.799	0.02	1.06	0.0000	0.0001	-0.0009	0.0000	0.0001	-0.0009
0.801	0.03	1.99	0.0001	0.0000	0.0002	0.0001	0.0000	0.0002
0.802	0.04	3.20	0.0001	0.0000	0.0005	0.0001	0.0000	0.0005
0.803	0.04	4.48	0.0001	0.0000	0.0013	0.0001	0.0000	0.0013
0.803	0.03	5.49	0.0001	-0.0001	0.0018	0.0001	-0.0001	0.0018
0.802	0.03	6.53	0.0001	-0.0001	0.0018	0.0001	-0.0001	0.0018
0.599	0.02	1.04	0.0001	0.0000	0.0002	0.0001	0.0000	0.0002
0.601	0.04	2.01	0.0001	-0.0001	0.0024	0.0001	-0.0001	0.0024
0.600	0.02	3.18	0.0001	-0.0002	0.0028	0.0001	-0.0002	0.0028
0.600	0.04	4.00	0.0001	-0.0002	0.0028	0.0001	-0.0002	0.0028
0.600	0.04	4.82	0.0001	-0.0002	0.0028	0.0001	-0.0002	0.0028
0.600	0.05	5.49	0.0001	-0.0003	0.0028	0.0001	-0.0003	0.0028
0.600	0.04	6.21	0.0001	-0.0003	0.0028	0.0001	-0.0003	0.0028
0.600	0.00	1.04	0.0001	0.0000	0.0002	0.0001	0.0000	0.0002
0.600	4.03	1.03	0.0001	0.0000	0.0002	0.0001	0.0000	0.0002
0.598	8.02	1.03	0.0001	0.0002	0.0001	0.0001	0.0002	0.0001
0.598	12.00	1.02	0.0001	0.0001	-0.0004	0.0001	0.0001	-0.0004
0.600	0.03	4.76	0.0001	-0.0002	0.0028	0.0001	-0.0002	0.0028
0.599	4.03	4.80	0.0001	-0.0002	0.0028	0.0001	-0.0002	0.0028
0.599	8.02	4.81	0.0001	-0.0002	0.0027	0.0001	-0.0002	0.0027
0.599	12.01	4.83	0.0001	-0.0001	0.0027	0.0001	-0.0001	0.0027

Table 9. Concluded

(b) Concluded

MACH	ALPHA	NPR	CR	CN	CY	CRA	CNA	CYA
0.202	0.00	1.00	-0.0004	0.0009	-0.0002	-0.0004	0.0009	-0.0002
0.203	0.01	1.52	0.0000	0.0002	0.0009	0.0000	0.0002	0.0009
0.201	0.01	2.01	0.0005	-0.0002	0.0009	0.0005	-0.0002	0.0009
0.201	0.02	2.59	0.0000	-0.0007	0.0059	0.0000	-0.0007	0.0059
0.201	0.03	3.19	0.0002	-0.0014	0.0048	0.0002	-0.0014	0.0048
0.202	0.04	4.01	0.0002	-0.0016	0.0160	0.0002	-0.0016	0.0160
0.203	0.03	4.99	0.0009	-0.0020	0.0178	0.0009	-0.0020	0.0178
0.201	0.01	1.01	0.0007	0.0007	-0.0029	0.0007	0.0007	-0.0029
0.202	4.04	1.00	0.0009	0.0005	-0.0006	0.0009	0.0005	-0.0006
0.202	8.01	1.00	0.0007	0.0008	-0.0007	0.0007	0.0008	-0.0007
0.202	12.02	1.00	0.0010	0.0008	-0.0009	0.0010	0.0008	-0.0009
0.202	14.52	1.00	0.0009	0.0002	0.0006	0.0009	0.0002	0.0006
0.202	0.04	3.20	0.0006	-0.0013	0.0190	0.0006	-0.0013	0.0190
0.202	4.04	3.19	0.0005	-0.0013	0.0190	0.0005	-0.0013	0.0190
0.202	8.02	3.19	0.0004	-0.0012	0.0191	0.0004	-0.0012	0.0191
0.203	12.04	3.19	0.0006	-0.0011	0.0185	0.0006	-0.0011	0.0185
0.203	14.53	3.19	0.0006	-0.0011	0.0175	0.0006	-0.0011	0.0175

Table 10. Longitudinal Aerodynamic Characteristics for Standard Nozzle With $\theta = 0^\circ$,
 $\delta_{v,p,l} = 10^\circ$, $\delta_{v,p,r} = 10^\circ$, and $\beta = 0^\circ$

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
1.199	-0.01	0.87	0.0005	0.0214	-0.0028	0.0005	0.0214	-0.0028
1.201	0.00	1.98	-0.0004	0.0064	-0.0013	-0.0037	0.0191	0.0017
1.201	0.01	3.20	0.0070	-0.0066	-0.0089	0.0013	0.0208	-0.0037
1.201	-0.01	4.03	0.0095	-0.0162	-0.0115	0.0017	0.0214	-0.0047
1.200	0.00	5.51	0.0152	-0.0350	-0.0158	0.0048	0.0209	-0.0068
1.200	-0.02	7.30	0.0192	-0.0584	-0.0190	0.0054	0.0195	-0.0074
1.201	-0.01	8.02	0.0202	-0.0678	-0.0201	0.0051	0.0190	-0.0074
0.901	0.00	1.01	-0.0087	0.0111	0.0055	-0.0087	0.0111	0.0055
0.900	-0.01	2.03	0.0059	-0.0133	-0.0094	-0.0002	0.0104	-0.0038
0.897	-0.01	3.22	0.0113	-0.0387	-0.0135	0.0010	0.0107	-0.0041
0.900	-0.01	3.99	0.0167	-0.0558	-0.0179	0.0030	0.0103	-0.0058
0.899	0.00	5.04	0.0222	-0.0786	-0.0227	0.0051	0.0106	-0.0079
0.900	-0.02	6.05	0.0275	-0.1006	-0.0269	0.0071	0.0106	-0.0095
0.901	-0.01	7.05	0.0330	-0.1229	-0.0310	0.0094	0.0099	-0.0110
0.902	0.01	1.02	-0.0100	0.0106	0.0058	-0.0100	0.0106	0.0058
0.899	4.02	1.03	-0.0064	0.0108	0.0031	-0.0064	0.0108	0.0031
0.901	7.99	1.02	-0.0037	0.0121	0.0041	-0.0037	0.0121	0.0041
0.899	11.98	1.01	0.0035	0.0151	0.0009	0.0035	0.0151	0.0009
0.901	0.00	6.06	0.0275	-0.1014	-0.0267	0.0071	0.0097	-0.0094
0.902	4.01	6.06	0.0399	-0.0977	-0.0295	0.0118	0.0116	-0.0122
0.901	8.00	6.05	0.0522	-0.0929	-0.0325	0.0165	0.0144	-0.0152
0.897	11.04	6.03	0.0643	-0.0877	-0.0355	0.0228	0.0179	-0.0180
0.801	0.00	1.02	-0.0056	0.0092	0.0014	-0.0056	0.0092	0.0014
0.800	0.00	2.00	0.0133	-0.0200	-0.0153	0.0059	0.0091	-0.0085
0.800	0.00	3.17	0.0191	-0.0521	-0.0193	0.0064	0.0088	-0.0077
0.800	0.00	4.49	0.0290	-0.0881	-0.0279	0.0096	0.0093	-0.0110
0.799	-0.01	5.54	0.0351	-0.1181	-0.0330	0.0114	0.0085	-0.0127
0.598	0.00	1.04	0.0062	0.0069	-0.0079	0.0062	0.0069	-0.0079
0.600	0.00	2.02	0.0289	-0.0440	-0.0279	0.0153	0.0088	-0.0155
0.600	-0.01	3.18	0.0333	-0.1004	-0.0326	0.0107	0.0081	-0.0119
0.599	-0.01	4.01	0.0462	-0.1425	-0.0405	0.0153	0.0073	-0.0133
0.599	-0.01	4.76	0.0512	-0.1797	-0.0465	0.0147	0.0077	-0.0149
0.599	-0.03	5.49	0.0578	-0.2156	-0.0510	0.0161	0.0073	-0.0151
0.600	0.01	1.04	0.0066	0.0073	-0.0085	0.0066	0.0073	-0.0085
0.600	4.01	1.04	0.0102	0.0086	-0.0100	0.0102	0.0086	-0.0100
0.600	7.99	1.03	0.0135	0.0117	-0.0116	0.0135	0.0117	-0.0116
0.603	12.01	1.03	0.0252	0.0170	-0.0186	0.0252	0.0170	-0.0186
0.599	0.01	4.78	0.0510	-0.1799	-0.0466	0.0143	0.0083	-0.0148
0.600	4.00	4.78	0.0678	-0.1751	-0.0482	0.0182	0.0096	-0.0165
0.602	7.99	4.79	0.0881	-0.1660	-0.0527	0.0261	0.0140	-0.0212
0.599	11.99	4.78	0.1124	-0.1562	-0.0589	0.0375	0.0201	-0.0272

Table 10. Concluded

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
0.203	0.02	1.00	0.0029	0.0092	-0.0127	0.0029	0.0092	-0.0127
0.199	-0.01	1.53	0.0600	-0.2525	-0.0683	-0.0001	0.0113	-0.0155
0.201	-0.01	2.00	0.1302	-0.4493	-0.1299	0.0110	0.0148	-0.0211
0.201	0.00	2.65	0.1573	-0.7257	-0.1468	0.0117	0.0133	-0.0093
0.201	-0.01	3.23	0.2220	-0.9781	-0.2047	0.0150	0.0131	-0.0154
0.201	-0.02	4.05	0.2858	-1.3320	-0.2556	0.0099	0.0128	-0.0128
0.200	0.01	1.01	0.0043	0.0088	-0.0106	0.0043	0.0088	-0.0106
0.201	4.02	1.01	0.0007	0.0061	-0.0080	0.0007	0.0061	-0.0080
0.201	7.99	1.01	0.0148	0.0080	-0.0168	0.0148	0.0080	-0.0168
0.201	11.98	1.01	0.0247	0.0185	-0.0207	0.0247	0.0185	-0.0207
0.200	14.52	1.00	0.0243	0.0175	-0.0251	0.0243	0.0175	-0.0251
0.202	-0.01	3.24	0.2195	-0.9681	-0.2019	0.0142	0.0137	-0.0145
0.202	4.03	3.24	0.2880	-0.9492	-0.2037	0.0138	0.0167	-0.0160
0.202	8.00	3.24	0.3772	-0.9213	-0.2091	0.0371	0.0224	-0.0216
0.202	12.01	3.24	0.4400	-0.8906	-0.2157	0.0345	0.0276	-0.0281
0.202	14.50	3.24	0.4794	-0.8718	-0.2217	0.0334	0.0296	-0.0337

Table 11. Aerodynamic Characteristics for Standard Nozzle With $\theta = 0^\circ$,
 $\delta_{v,p,l} = 20^\circ$, $\delta_{v,p,r} = 20^\circ$, and $\beta = 0^\circ$

(a) Longitudinal characteristics

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
1.198	-0.01	0.76	0.0125	0.0246	-0.0133	0.0125	0.0246	-0.0133
1.198	0.00	2.03	0.0117	0.0077	-0.0121	0.0054	0.0194	-0.0071
1.199	-0.01	3.19	0.0228	-0.0026	-0.0212	0.0119	0.0215	-0.0121
1.200	-0.01	3.96	0.0278	-0.0093	-0.0261	0.0137	0.0236	-0.0145
1.201	-0.04	5.51	0.0386	-0.0261	-0.0344	0.0191	0.0248	-0.0184
1.201	-0.02	6.22	0.0405	-0.0352	-0.0362	0.0184	0.0240	-0.0180
1.198	-0.02	7.28	0.0430	-0.0488	-0.0382	0.0170	0.0231	-0.0169
1.198	-0.02	7.81	0.0448	-0.0554	-0.0394	0.0169	0.0226	-0.0166
1.204	-0.03	8.02	0.0451	-0.0578	-0.0400	0.0167	0.0219	-0.0168
0.901	0.01	0.96	-0.0036	0.0125	0.0005	-0.0036	0.0125	0.0005
0.900	-0.03	2.00	0.0227	-0.0071	-0.0219	0.0119	0.0130	-0.0132
0.902	-0.03	3.22	0.0253	-0.0313	-0.0248	0.0057	0.0119	-0.0086
0.901	-0.03	3.99	0.0379	-0.0460	-0.0345	0.0128	0.0131	-0.0137
0.902	-0.01	5.01	0.0475	-0.0659	-0.0428	0.0160	0.0140	-0.0169
0.900	-0.02	6.03	0.0583	-0.0869	-0.0507	0.0202	0.0142	-0.0194
0.900	-0.03	6.98	0.0669	-0.1067	-0.0578	0.0226	0.0144	-0.0216
0.902	0.03	0.97	-0.0038	0.0118	0.0006	-0.0038	0.0118	0.0006
0.900	4.03	0.96	-0.0007	0.0132	-0.0021	-0.0007	0.0132	-0.0021
0.898	7.98	0.94	0.0058	0.0160	-0.0053	0.0058	0.0160	-0.0053
0.900	11.09	0.93	0.0139	0.0191	-0.0099	0.0139	0.0191	-0.0099
0.900	-0.03	6.01	0.0579	-0.0871	-0.0507	0.0199	0.0138	-0.0195
0.899	3.99	6.02	0.0700	-0.0810	-0.0545	0.0249	0.0175	-0.0232
0.898	8.01	6.01	0.0838	-0.0729	-0.0600	0.0317	0.0223	-0.0287
0.899	10.87	6.05	0.0947	-0.0661	-0.0643	0.0377	0.0269	-0.0329
0.800	0.03	0.96	0.0004	0.0111	-0.0028	0.0004	0.0111	-0.0028
0.800	-0.02	2.01	0.0329	-0.0121	-0.0312	0.0191	0.0136	-0.0201
0.800	-0.01	3.21	0.0377	-0.0436	-0.0341	0.0130	0.0109	-0.0136
0.800	-0.03	4.49	0.0571	-0.0745	-0.0503	0.0213	0.0135	-0.0207
0.802	-0.05	5.51	0.0691	-0.1006	-0.0594	0.0251	0.0138	-0.0233
0.600	-0.01	0.99	0.0178	0.0111	-0.0169	0.0178	0.0111	-0.0169
0.601	-0.03	2.02	0.0618	-0.0322	-0.0540	0.0371	0.0135	-0.0342
0.601	0.00	3.19	0.0674	-0.0858	-0.0599	0.0240	0.0097	-0.0240
0.603	-0.03	4.00	0.0867	-0.1207	-0.0750	0.0304	0.0116	-0.0285
0.601	-0.03	4.80	0.1000	-0.1578	-0.0860	0.0320	0.0125	-0.0300
0.601	-0.02	5.49	0.1121	-0.1901	-0.0946	0.0343	0.0119	-0.0307
0.602	0.00	1.00	0.0150	0.0104	-0.0151	0.0150	0.0104	-0.0151
0.603	4.03	1.00	0.0282	0.0143	-0.0246	0.0282	0.0143	-0.0246
0.600	8.01	0.99	0.0355	0.0197	-0.0282	0.0355	0.0197	-0.0282
0.601	10.14	0.99	0.0390	0.0233	-0.0317	0.0390	0.0233	-0.0317
0.601	-0.01	4.82	0.1018	-0.1590	-0.0858	0.0335	0.0122	-0.0296
0.602	4.00	4.80	0.1216	-0.1494	-0.0910	0.0419	0.0156	-0.0351
0.601	7.99	4.82	0.1393	-0.1383	-0.0968	0.0478	0.0215	-0.0406
0.601	11.07	4.81	0.1568	-0.1261	-0.1019	0.0569	0.0285	-0.0457

Table 11. Continued

(a) Concluded

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
0.202	0.02	1.00	0.0176	0.0092	-0.0218	0.0176	0.0092	-0.0218
0.199	0.03	1.52	0.1266	-0.2144	-0.1191	0.0110	0.0119	-0.0294
0.199	-0.03	2.00	0.2383	-0.3952	-0.2208	0.0175	0.0142	-0.0432
0.200	-0.01	2.60	0.3351	-0.6235	-0.3037	0.0356	0.0169	-0.0493
0.200	-0.03	3.20	0.3969	-0.8700	-0.3557	0.0024	-0.0005	-0.0293
0.201	-0.03	4.00	0.5269	-1.1880	-0.4535	0.0182	0.0080	-0.0329
0.200	0.02	1.00	0.0022	0.0097	-0.0176	0.0022	0.0097	-0.0176
0.201	4.03	1.00	0.0294	0.0113	-0.0232	0.0294	0.0113	-0.0232
0.200	7.99	1.00	0.0287	0.0224	-0.0299	0.0287	0.0224	-0.0299
0.200	12.02	1.00	0.0538	0.0290	-0.0363	0.0538	0.0290	-0.0363
0.200	14.52	1.00	0.0488	0.0391	-0.0420	0.0488	0.0391	-0.0420
0.201	-0.02	3.21	0.3996	-0.8610	-0.3511	0.0089	-0.0001	-0.0281
0.201	4.02	3.22	0.4816	-0.8354	-0.3575	0.0270	0.0042	-0.0315
0.201	8.02	3.22	0.5412	-0.7937	-0.3635	0.0312	0.0086	-0.0389
0.201	12.00	3.22	0.6178	-0.7422	-0.3731	0.0523	0.0241	-0.0479
0.201	14.52	3.22	0.6483	-0.7159	-0.3775	0.0493	0.0254	-0.0521

Table 11. Continued

(b) Lateral characteristics

MACH	ALPHA	NPR	CR	CN	CY	CRA	CNA	CYA
1.198	-0.01	0.76	0.0000	0.0005	0.0008	0.0000	0.0005	0.0008
1.198	0.00	2.03	0.0001	0.0002	0.0024	0.0001	0.0002	0.0024
1.199	-0.01	3.19	0.0000	0.0003	0.0030	0.0000	0.0003	0.0030
1.200	-0.01	3.96	0.0000	0.0005	0.0031	0.0000	0.0005	0.0031
1.201	-0.04	5.51	0.0002	0.0004	0.0031	0.0002	0.0004	0.0031
1.201	-0.02	6.22	0.0002	0.0004	0.0035	0.0002	0.0004	0.0035
1.198	-0.02	7.28	0.0002	0.0005	0.0031	0.0001	0.0005	0.0033
1.198	-0.02	7.81	0.0001	0.0005	0.0033	0.0001	0.0005	0.0033
1.204	-0.03	8.02	0.0001	0.0005	0.0036	0.0001	0.0005	0.0036
0.901	0.01	0.96	0.0001	0.0001	0.0024	0.0001	0.0001	0.0024
0.900	-0.03	2.00	0.0001	0.0003	0.0022	0.0001	0.0003	0.0022
0.902	-0.03	3.22	0.0002	0.0002	0.0023	0.0002	0.0002	0.0023
0.901	-0.03	3.99	0.0002	0.0003	0.0025	0.0002	0.0003	0.0025
0.902	-0.01	5.01	0.0002	0.0004	0.0035	0.0002	0.0004	0.0035
0.900	-0.02	6.03	0.0002	0.0005	0.0035	0.0002	0.0005	0.0035
0.900	-0.03	6.98	0.0002	0.0006	0.0032	0.0002	0.0006	0.0032
0.902	0.03	0.97	0.0001	0.0001	0.0015	0.0001	0.0001	0.0015
0.900	4.03	0.96	0.0001	0.0002	0.0009	0.0001	0.0002	0.0009
0.898	7.98	0.94	0.0001	0.0003	0.0009	0.0001	0.0003	0.0009
0.900	11.09	0.93	0.0001	0.0001	0.0015	0.0001	0.0001	0.0015
0.900	-0.03	6.01	0.0002	0.0005	0.0032	0.0002	0.0005	0.0032
0.899	3.99	6.02	0.0003	0.0007	0.0020	0.0003	0.0007	0.0020
0.898	8.01	6.01	0.0003	0.0007	0.0020	0.0003	0.0007	0.0020
0.899	10.87	6.05	0.0002	0.0006	0.0032	0.0002	0.0006	0.0032
0.800	0.03	0.96	0.0001	0.0001	0.0011	0.0001	0.0001	0.0011
0.800	-0.02	2.01	0.0002	0.0005	0.0008	0.0002	0.0005	0.0008
0.800	-0.01	3.21	0.0002	0.0004	0.0008	0.0002	0.0004	0.0008
0.800	-0.03	4.49	0.0003	0.0006	0.0023	0.0003	0.0006	0.0023
0.802	-0.05	5.51	0.0003	0.0006	0.0021	0.0003	0.0006	0.0021
0.600	-0.01	0.99	0.0006	0.0006	-0.0016	0.0006	0.0006	-0.0016
0.601	-0.03	2.02	0.0003	0.0005	0.0007	0.0003	0.0005	0.0007
0.601	0.00	3.19	0.0004	0.0008	0.0007	0.0004	0.0008	0.0008
0.603	-0.03	4.00	0.0005	0.0008	0.0008	0.0005	0.0008	0.0008
0.601	-0.03	4.80	0.0005	0.0008	0.0008	0.0005	0.0008	0.0008
0.601	-0.02	5.49	0.0004	0.0008	0.0012	0.0004	0.0008	0.0012
0.602	0.00	1.00	0.0006	0.0007	-0.0017	0.0006	0.0007	-0.0017
0.603	4.03	1.00	0.0002	0.0004	-0.0012	0.0002	0.0004	-0.0012
0.600	8.01	0.99	0.0003	0.0006	-0.0016	0.0003	0.0006	-0.0016
0.601	10.14	0.99	0.0003	0.0006	-0.0017	0.0003	0.0006	-0.0017
0.601	-0.01	4.82	0.0005	0.0008	0.0008	0.0005	0.0008	0.0008
0.602	4.00	4.80	0.0003	0.0009	0.0007	0.0003	0.0009	0.0007
0.601	7.99	4.82	0.0004	0.0012	0.0006	0.0004	0.0012	0.0006
0.601	11.07	4.81	0.0003	0.0011	0.0006	0.0003	0.0011	0.0006

Table 11. Concluded

(b) Concluded

MACH	ALPHA	NPR	CR	CN	CY	CRA	CNA	CYA
0.202	0.02	1.00	0.0001	0.0010	-0.0080	0.0001	0.0010	-0.0080
0.199	0.03	1.52	0.0006	0.0009	-0.0221	0.0006	0.0009	-0.0221
0.199	-0.03	2.00	0.0011	0.0012	-0.0235	0.0011	0.0012	-0.0235
0.200	-0.01	2.60	0.0012	0.0025	-0.0188	0.0012	0.0025	-0.0188
0.200	-0.03	3.20	0.0013	0.0029	-0.0125	0.0013	0.0029	-0.0125
0.201	-0.03	4.00	0.0015	0.0035	-0.0098	0.0015	0.0035	-0.0098
0.200	0.02	1.00	0.0003	0.0012	-0.0182	0.0003	0.0012	-0.0182
0.201	4.03	1.00	0.0001	0.0008	-0.0081	0.0001	0.0008	-0.0081
0.200	7.99	1.00	0.0002	0.0005	-0.0079	0.0002	0.0005	-0.0079
0.200	12.02	1.00	0.0001	0.0006	-0.0082	0.0001	0.0006	-0.0082
0.200	14.52	1.00	0.0001	0.0009	-0.0072	0.0001	0.0009	-0.0072
0.201	-0.02	3.21	0.0012	0.0030	-0.0114	0.0012	0.0030	-0.0114
0.201	4.02	3.22	0.0013	0.0025	-0.0102	0.0013	0.0025	-0.0102
0.201	8.02	3.22	0.0012	0.0025	-0.0112	0.0012	0.0025	-0.0112
0.201	12.00	3.22	0.0010	0.0022	-0.0035	0.0010	0.0022	-0.0035
0.201	14.52	3.22	0.0011	0.0022	-0.0034	0.0011	0.0022	-0.0034

Table 12. Longitudinal Aerodynamic Characteristics for Standard Nozzle With $\theta = 0^\circ$,
 $\delta_{v,p,l} = 30^\circ$, $\delta_{v,p,r} = 30^\circ$, and $\beta = 0^\circ$

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
0.898	-0.02	0.91	0.0138	0.0163	-0.0152	0.0138	0.0163	-0.0152
0.900	-0.03	2.04	0.0432	0.0033	-0.0408	0.0311	0.0197	-0.0291
0.897	-0.03	3.23	0.0603	-0.0140	-0.0556	0.0336	0.0213	-0.0319
0.898	-0.03	4.03	0.0681	-0.0277	-0.0626	0.0316	0.0197	-0.0300
0.901	-0.02	5.01	0.0793	-0.0439	-0.0722	0.0358	0.0214	-0.0337
0.899	-0.05	6.02	0.0927	-0.0616	-0.0837	0.0417	0.0227	-0.0388
0.901	-0.05	7.03	0.1053	-0.0787	-0.0940	0.0470	0.0242	-0.0429
0.900	0.01	0.92	0.0157	0.0165	-0.0161	0.0157	0.0165	-0.0161
0.899	4.02	0.90	0.0226	0.0214	-0.0215	0.0226	0.0214	-0.0215
0.899	7.98	0.87	0.0303	0.0273	-0.0274	0.0303	0.0273	-0.0274
0.898	11.53	0.82	0.0399	0.0352	-0.0346	0.0399	0.0352	-0.0346
0.897	-0.04	5.99	0.0919	-0.0613	-0.0837	0.0409	0.0228	-0.0387
0.899	3.96	6.02	0.1063	-0.0511	-0.0904	0.0495	0.0295	-0.0454
0.902	7.99	6.04	0.1199	-0.0386	-0.0969	0.0576	0.0378	-0.0520
0.899	10.88	6.03	0.1312	-0.0284	-0.1029	0.0649	0.0450	-0.0578
0.803	0.03	0.92	0.0177	0.0165	-0.0175	0.0177	0.0165	-0.0175
0.802	-0.04	2.03	0.0576	0.0025	-0.0531	0.0424	0.0230	-0.0385
0.803	-0.03	3.20	0.0813	-0.0172	-0.0752	0.0485	0.0263	-0.0462
0.803	-0.04	4.52	0.0934	-0.0496	-0.0838	0.0430	0.0212	-0.0391
0.803	-0.04	5.51	0.1059	-0.0708	-0.0946	0.0465	0.0231	-0.0422
0.598	0.01	0.97	0.0265	0.0180	-0.0261	0.0265	0.0180	-0.0261
0.598	-0.03	2.00	0.0901	-0.0104	-0.0793	0.0636	0.0256	-0.0537
0.598	-0.03	3.21	0.1295	-0.0495	-0.1137	0.0700	0.0292	-0.0611
0.600	-0.04	4.00	0.1390	-0.0825	-0.1231	0.0575	0.0226	-0.0505
0.599	-0.04	4.80	0.1501	-0.1167	-0.1328	0.0553	0.0218	-0.0487
0.599	-0.04	5.49	0.1656	-0.1457	-0.1440	0.0591	0.0223	-0.0500
0.599	0.01	0.98	0.0311	0.0179	-0.0284	0.0311	0.0179	-0.0284
0.599	4.02	0.97	0.0490	0.0255	-0.0426	0.0490	0.0255	-0.0426
0.597	8.00	0.96	0.0557	0.0344	-0.0475	0.0557	0.0344	-0.0475
0.601	11.70	0.94	0.0633	0.0439	-0.0548	0.0633	0.0439	-0.0548
0.601	-0.03	4.82	0.1499	-0.1168	-0.1329	0.0552	0.0219	-0.0490
0.602	3.96	4.80	0.1694	-0.1017	-0.1406	0.0662	0.0286	-0.0573
0.601	7.99	4.80	0.1854	-0.0861	-0.1461	0.0730	0.0370	-0.0627
0.600	11.40	4.80	0.2026	-0.0694	-0.1526	0.0827	0.0470	-0.0689

Table 12. Concluded

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
0.202	0.02	1.00	0.0410	0.0199	-0.0442	0.0410	0.0199	-0.0442
0.203	-0.03	1.49	0.1599	-0.1384	-0.1607	0.0615	0.0279	-0.0504
0.203	-0.02	2.00	0.3110	-0.2720	-0.2926	0.0798	0.0416	-0.0695
0.201	-0.01	2.60	0.4548	-0.4670	-0.4169	0.0620	0.0268	-0.0561
0.201	-0.02	3.20	0.5911	-0.6573	-0.5383	0.0668	0.0363	-0.0746
0.202	-0.04	3.99	0.7719	-0.9000	-0.6964	0.0533	0.0260	-0.0559
0.201	0.04	1.00	0.0382	0.0189	-0.0393	0.0382	0.0189	-0.0393
0.202	4.02	1.00	0.0364	0.0275	-0.0428	0.0364	0.0275	-0.0428
0.202	8.00	1.00	0.0498	0.0329	-0.0487	0.0498	0.0329	-0.0487
0.202	12.03	1.00	0.0584	0.0402	-0.0591	0.0584	0.0402	-0.0591
0.202	14.52	1.00	0.0546	0.0479	-0.0614	0.0546	0.0479	-0.0614
0.201	-0.01	3.18	0.5938	-0.6492	-0.5313	0.0726	0.0410	-0.0707
0.200	4.01	3.21	0.6690	-0.6158	-0.5513	0.0902	0.0469	-0.0817
0.200	8.01	3.21	0.7141	-0.5587	-0.5609	0.0892	0.0633	-0.0904
0.200	12.01	3.21	0.7674	-0.4977	-0.5707	0.1021	0.0778	-0.1013
0.200	14.39	3.21	0.7939	-0.4605	-0.5754	0.1056	0.0868	-0.1061

Table 13. Aerodynamic Characteristics for Standard Nozzle With $\theta = 0^\circ$,
 $\delta_{v,p,l} = -20^\circ$, $\delta_{v,p,r} = 20^\circ$, and $\beta = 0^\circ$

(a) Longitudinal characteristics

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
1.201	0.04	0.75	-0.0021	0.0266	0.0000	-0.0021	0.0266	0.0000
1.200	0.01	2.00	-0.0013	0.0081	-0.0009	-0.0013	0.0194	-0.0009
1.201	0.02	3.20	-0.0007	-0.0019	-0.0001	-0.0007	0.0223	-0.0001
1.200	0.04	4.01	-0.0003	-0.0099	-0.0004	-0.0003	0.0237	-0.0004
1.200	0.04	5.51	-0.0011	-0.0267	0.0007	-0.0012	0.0241	0.0007
1.201	0.04	7.30	-0.0006	-0.0495	0.0004	-0.0007	0.0217	0.0004
1.202	0.03	8.00	-0.0004	-0.0583	0.0005	-0.0004	0.0207	0.0005
0.901	0.01	0.95	-0.0048	0.0125	0.0001	-0.0048	0.0125	0.0001
0.901	0.05	1.99	-0.0037	-0.0071	-0.0005	-0.0037	0.0128	-0.0005
0.903	0.05	3.21	-0.0039	-0.0312	0.0003	-0.0039	0.0120	0.0003
0.901	0.04	4.01	-0.0034	-0.0467	0.0003	-0.0034	0.0128	0.0003
0.902	0.05	5.03	-0.0039	-0.0671	0.0003	-0.0040	0.0131	0.0003
0.900	0.04	6.01	-0.0038	-0.0876	0.0001	-0.0039	0.0127	0.0001
0.901	0.04	6.98	-0.0025	-0.1074	0.0001	-0.0026	0.0126	0.0001
0.900	0.00	0.97	-0.0059	0.0120	0.0001	-0.0059	0.0120	0.0001
0.900	4.03	0.96	-0.0002	0.0132	-0.0029	-0.0002	0.0132	-0.0029
0.900	8.01	0.94	0.0050	0.0160	-0.0056	0.0050	0.0160	-0.0056
0.898	11.15	0.93	0.0113	0.0187	-0.0085	0.0113	0.0187	-0.0085
0.899	0.02	5.99	-0.0040	-0.0879	0.0001	-0.0040	0.0126	0.0001
0.899	4.03	6.02	0.0094	-0.0867	-0.0032	0.0023	0.0138	-0.0032
0.897	8.03	6.00	0.0235	-0.0836	-0.0075	0.0094	0.0162	-0.0075
0.903	9.57	6.03	0.0295	-0.0813	-0.0094	0.0129	0.0174	-0.0094
0.800	0.04	0.98	-0.0041	0.0115	-0.0001	-0.0041	0.0115	-0.0001
0.800	0.04	2.01	-0.0027	-0.0128	-0.0002	-0.0027	0.0129	-0.0002
0.801	0.02	3.20	-0.0033	-0.0432	-0.0003	-0.0033	0.0114	-0.0003
0.801	0.03	4.51	-0.0017	-0.0755	-0.0002	-0.0017	0.0127	-0.0002
0.800	0.03	5.49	-0.0021	-0.1018	-0.0002	-0.0022	0.0121	-0.0002
0.599	0.00	1.00	0.0026	0.0108	-0.0049	0.0026	0.0108	-0.0049
0.600	0.04	2.02	-0.0042	-0.0329	-0.0003	-0.0042	0.0129	-0.0003
0.601	0.01	3.24	-0.0034	-0.0884	0.0001	-0.0034	0.0099	0.0001
0.601	0.05	3.98	-0.0028	-0.1214	0.0004	-0.0029	0.0108	0.0004
0.603	0.05	4.79	-0.0035	-0.1574	0.0005	-0.0036	0.0110	0.0005
0.603	0.04	5.49	-0.0038	-0.1902	0.0007	-0.0039	0.0100	0.0007
0.603	0.01	1.00	0.0002	0.0107	-0.0044	0.0002	0.0107	-0.0044
0.599	4.03	1.01	-0.0027	0.0107	-0.0010	-0.0027	0.0107	-0.0010
0.600	8.01	1.01	0.0046	0.0127	-0.0038	0.0046	0.0127	-0.0038
0.600	11.61	1.01	0.0121	0.0163	-0.0078	0.0121	0.0163	-0.0078
0.600	0.05	4.81	-0.0036	-0.1603	0.0010	-0.0037	0.0108	0.0010
0.600	4.04	4.81	0.0130	-0.1593	-0.0020	0.0009	0.0112	-0.0020
0.600	8.01	4.81	0.0315	-0.1560	-0.0062	0.0077	0.0133	-0.0062
0.600	10.01	4.81	0.0421	-0.1529	-0.0086	0.0124	0.0154	-0.0086

Table 13. Continued

(a) Concluded

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
0.202	0.04	1.00	-0.0143	0.0060	-0.0003	-0.0143	0.0060	-0.0003
0.203	0.05	1.51	-0.0094	-0.2075	0.0005	-0.0096	0.0135	0.0005
0.200	0.04	1.99	-0.0055	-0.3896	-0.0026	-0.0058	0.0158	-0.0026
0.200	0.04	2.60	-0.0101	-0.6209	-0.0022	-0.0105	0.0159	-0.0022
0.201	0.05	3.19	0.0036	-0.8537	-0.0011	0.0029	0.0100	-0.0011
0.201	0.04	3.99	0.0021	-1.1790	0.0011	0.0012	0.0133	0.0011
0.200	-0.01	1.00	-0.0128	0.0078	-0.0002	-0.0128	0.0078	-0.0002
0.201	4.03	1.00	0.0083	0.0060	-0.0013	0.0083	0.0060	-0.0013
0.200	8.01	1.00	0.0106	0.0153	-0.0037	0.0106	0.0153	-0.0037
0.200	12.04	1.00	0.0205	0.0183	-0.0122	0.0205	0.0183	-0.0122
0.200	14.50	1.00	0.0333	0.0234	-0.0147	0.0333	0.0234	-0.0147
0.201	0.05	3.21	0.0104	-0.8582	0.0000	0.0097	0.0089	0.0000
0.201	4.03	3.20	0.0695	-0.8462	-0.0023	0.0089	0.0135	-0.0023
0.201	8.04	3.19	0.1501	-0.8344	-0.0054	0.0299	0.0165	-0.0054
0.201	12.02	3.19	0.2116	-0.8119	-0.0149	0.0333	0.0256	-0.0149
0.201	14.53	3.18	0.2506	-0.8041	-0.0161	0.0354	0.0259	-0.0161

Table 13. Continued

(b) Lateral characteristics

MACH	ALPHA	NPR	CR	CN	CY	CRA	CNA	CYA
1.201	0.04	0.75	-0.0011	0.0003	0.0030	-0.0011	0.0003	0.0030
1.200	0.01	2.00	-0.0008	0.0001	0.0036	-0.0004	0.0001	0.0036
1.201	0.02	3.20	-0.0015	0.0002	0.0034	-0.0009	0.0002	0.0034
1.200	0.04	4.01	-0.0020	0.0003	0.0035	-0.0011	0.0003	0.0035
1.200	0.04	5.51	-0.0025	0.0002	0.0036	-0.0012	0.0002	0.0036
1.201	0.04	7.30	-0.0028	0.0002	0.0038	-0.0011	0.0002	0.0038
1.202	0.03	8.00	-0.0029	0.0002	0.0039	-0.0010	0.0002	0.0039
0.901	0.01	0.95	0.0000	0.0001	0.0023	0.0000	0.0001	0.0023
0.901	0.05	1.99	-0.0012	0.0001	0.0023	-0.0005	0.0001	0.0023
0.903	0.05	3.21	-0.0016	0.0002	0.0022	-0.0004	0.0002	0.0022
0.901	0.04	4.01	-0.0022	0.0002	0.0021	-0.0007	0.0002	0.0021
0.902	0.05	5.03	-0.0027	0.0002	0.0018	-0.0007	0.0002	0.0018
0.900	0.04	6.01	-0.0032	0.0002	0.0017	-0.0007	0.0002	0.0017
0.901	0.04	6.98	-0.0036	0.0002	0.0018	-0.0007	0.0002	0.0018
0.900	0.00	0.97	0.0000	0.0002	0.0018	0.0000	0.0002	0.0018
0.900	4.03	0.96	0.0000	0.0000	0.0020	0.0000	0.0000	0.0020
0.900	8.01	0.94	0.0000	-0.0002	0.0021	0.0000	-0.0002	0.0021
0.898	11.15	0.93	0.0000	-0.0005	0.0035	0.0000	-0.0005	0.0035
0.899	0.02	5.99	-0.0032	0.0002	0.0016	-0.0007	0.0002	0.0016
0.899	4.03	6.02	-0.0032	0.0000	0.0025	-0.0007	0.0000	0.0025
0.897	8.03	6.00	-0.0032	-0.0002	0.0029	-0.0007	-0.0002	0.0029
0.903	9.57	6.03	-0.0032	-0.0003	0.0033	-0.0007	-0.0003	0.0033
0.800	0.04	0.98	-0.0001	0.0002	0.0020	-0.0001	0.0002	0.0020
0.800	0.04	2.01	-0.0017	0.0001	0.0017	-0.0009	0.0001	0.0017
0.801	0.02	3.20	-0.0021	0.0002	0.0011	-0.0005	0.0002	0.0011
0.801	0.03	4.51	-0.0031	0.0002	0.0015	-0.0008	0.0002	0.0015
0.800	0.03	5.49	-0.0037	0.0002	0.0018	-0.0008	0.0002	0.0018
0.599	0.00	1.00	-0.0008	-0.0001	0.0025	-0.0008	-0.0001	0.0025
0.600	0.04	2.02	-0.0033	0.0002	0.0017	-0.0018	0.0002	0.0017
0.601	0.01	3.24	-0.0042	0.0002	0.0014	-0.0014	0.0002	0.0014
0.601	0.05	3.98	-0.0051	0.0002	0.0009	-0.0016	0.0002	0.0009
0.603	0.05	4.79	-0.0058	0.0002	0.0004	-0.0015	0.0002	0.0004
0.603	0.04	5.49	-0.0063	0.0002	0.0006	-0.0013	0.0002	0.0006
0.603	0.01	1.00	-0.0009	-0.0001	0.0009	-0.0009	-0.0001	0.0009
0.599	4.03	1.01	-0.0012	-0.0003	0.0014	-0.0012	-0.0003	0.0014
0.600	8.01	1.01	-0.0010	-0.0006	0.0032	-0.0010	-0.0006	0.0032
0.600	11.61	1.01	-0.0011	-0.0008	0.0038	-0.0011	-0.0008	0.0038
0.600	0.05	4.81	-0.0058	0.0002	0.0002	-0.0015	0.0002	0.0002
0.600	4.04	4.81	-0.0059	-0.0004	0.0030	-0.0016	-0.0004	0.0030
0.600	8.01	4.81	-0.0057	-0.0009	0.0034	-0.0013	-0.0009	0.0034
0.600	10.01	4.81	-0.0058	-0.0010	0.0047	-0.0014	-0.0010	0.0047

Table 13. Concluded

(b) Concluded

MACH	ALPHA	NPR	CR	CN	CY	CRA	CNA	CYA
0.202	0.04	1.00	-0.0008	0.0010	0.0012	-0.0008	0.0010	0.0012
0.203	0.05	1.51	-0.0082	0.0011	0.0027	0.0009	0.0011	0.0027
0.200	0.04	1.99	-0.0156	0.0014	-0.0099	-0.0019	0.0014	-0.0099
0.200	0.04	2.60	-0.0218	0.0014	-0.0093	-0.0027	0.0014	-0.0093
0.201	0.05	3.19	-0.0267	0.0013	-0.0072	-0.0024	0.0013	-0.0072
0.201	0.04	3.99	-0.0343	0.0014	-0.0062	-0.0028	0.0014	-0.0062
0.200	-0.01	1.00	-0.0006	0.0009	-0.0078	-0.0006	0.0009	-0.0078
0.201	4.03	1.00	-0.0009	0.0009	-0.0001	-0.0009	0.0009	-0.0001
0.200	8.01	1.00	-0.0009	0.0001	0.0015	-0.0009	0.0001	0.0015
0.200	12.04	1.00	-0.0010	-0.0002	0.0017	-0.0010	-0.0002	0.0017
0.200	14.50	1.00	-0.0009	0.0000	0.0014	-0.0009	0.0000	0.0014
0.201	0.05	3.21	-0.0267	0.0004	-0.0056	-0.0023	0.0004	-0.0056
0.201	4.03	3.20	-0.0265	-0.0004	-0.0039	-0.0022	-0.0004	-0.0039
0.201	8.04	3.19	-0.0266	-0.0013	-0.0003	-0.0023	-0.0013	-0.0003
0.201	12.02	3.19	-0.0264	-0.0015	0.0119	-0.0022	-0.0015	0.0119
0.201	14.53	3.18	-0.0266	-0.0021	0.0123	-0.0024	-0.0021	0.0123

Table 14. Aerodynamic Characteristics for Standard Nozzle With $\theta = 0^\circ$,
 $\delta_{v,p,l} = 0^\circ$, $\delta_{v,p,r} = 0^\circ$, and $\beta = 5^\circ$

(a) Longitudinal characteristics

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
1.199	0.01	0.87	-0.0060	0.0231	0.0022	-0.0060	0.0231	0.0022
1.200	0.02	2.16	-0.0068	0.0040	0.0026	-0.0068	0.0200	0.0026
1.199	0.02	3.18	-0.0071	-0.0079	0.0026	-0.0072	0.0213	0.0026
1.200	0.02	4.03	-0.0073	-0.0184	0.0026	-0.0073	0.0215	0.0026
1.200	0.01	5.53	-0.0075	-0.0388	0.0026	-0.0075	0.0202	0.0026
1.201	0.01	7.34	-0.0071	-0.0636	0.0026	-0.0071	0.0182	0.0026
1.198	0.01	8.00	-0.0070	-0.0729	0.0025	-0.0070	0.0178	0.0025
0.900	-0.01	1.05	-0.0014	0.0102	-0.0015	-0.0014	0.0102	-0.0015
0.900	0.02	2.00	-0.0032	-0.0162	0.0004	-0.0032	0.0086	0.0004
0.901	0.01	3.23	-0.0041	-0.0438	0.0011	-0.0041	0.0089	0.0011
0.900	0.01	4.04	-0.0045	-0.0629	0.0011	-0.0046	0.0082	0.0011
0.901	0.02	5.02	-0.0051	-0.0844	0.0011	-0.0051	0.0085	0.0011
0.901	0.01	5.96	-0.0051	-0.1066	0.0010	-0.0052	0.0076	0.0010
0.900	0.01	7.04	-0.0050	-0.1321	0.0010	-0.0050	0.0068	0.0010
0.900	-0.02	1.05	-0.0014	0.0095	-0.0013	-0.0014	0.0095	-0.0013
0.903	4.01	1.04	0.0057	0.0118	-0.0065	0.0057	0.0118	-0.0065
0.899	7.99	1.03	0.0092	0.0143	-0.0064	0.0092	0.0143	-0.0064
0.902	12.01	1.02	0.0116	0.0176	-0.0062	0.0116	0.0176	-0.0062
0.903	0.01	5.97	-0.0056	-0.1069	0.0010	-0.0056	0.0074	0.0010
0.901	4.02	6.07	0.0052	-0.1088	0.0001	-0.0030	0.0077	0.0001
0.900	7.99	5.95	0.0205	-0.1030	-0.0031	0.0046	0.0103	-0.0031
0.900	12.01	5.97	0.0362	-0.0991	-0.0067	0.0124	0.0132	-0.0067
0.800	0.03	1.06	-0.0058	0.0062	0.0024	-0.0058	0.0062	0.0024
0.799	0.01	2.02	-0.0038	-0.0255	0.0000	-0.0038	0.0066	0.0000
0.799	0.02	3.23	-0.0049	-0.0604	0.0012	-0.0049	0.0065	0.0012
0.802	0.02	4.51	-0.0056	-0.0972	0.0012	-0.0056	0.0059	0.0012
0.798	0.02	5.54	-0.0064	-0.1274	0.0014	-0.0064	0.0061	0.0014
0.601	-0.01	1.02	-0.0047	0.0056	0.0009	-0.0047	0.0056	0.0009
0.601	0.00	2.01	-0.0063	-0.0501	0.0015	-0.0063	0.0065	0.0015
0.601	0.01	3.27	-0.0082	-0.1144	0.0025	-0.0082	0.0059	0.0025
0.600	0.02	3.97	-0.0091	-0.1506	0.0028	-0.0092	0.0058	0.0028
0.601	0.00	4.78	-0.0100	-0.1915	0.0032	-0.0100	0.0056	0.0032
0.601	0.02	5.61	-0.0111	-0.2337	0.0038	-0.0112	0.0054	0.0038
0.600	-0.01	1.04	-0.0077	0.0056	0.0018	-0.0077	0.0056	0.0018
0.601	4.01	1.04	-0.0039	0.0060	0.0005	-0.0039	0.0060	0.0005
0.600	7.99	1.03	0.0037	0.0080	-0.0028	0.0037	0.0080	-0.0028
0.599	12.00	1.03	0.0122	0.0114	-0.0067	0.0122	0.0114	-0.0067
0.598	0.01	4.82	-0.0104	-0.1948	0.0034	-0.0104	0.0065	0.0034
0.600	4.02	4.78	0.0076	-0.1908	0.0021	-0.0063	0.0063	0.0021
0.601	8.00	4.82	0.0303	-0.1894	-0.0033	0.0026	0.0078	-0.0033
0.600	11.99	4.78	0.0557	-0.1832	-0.0092	0.0146	0.0104	-0.0092
0.597	0.01	1.03	-0.0056	0.0055	0.0022	-0.0056	0.0055	0.0022
0.599	0.02	2.03	-0.0065	-0.0514	0.0022	-0.0066	0.0067	0.0022
0.600	0.01	3.25	-0.0080	-0.1132	0.0031	-0.0080	0.0065	0.0031
0.599	0.02	4.02	-0.0093	-0.1532	0.0034	-0.0094	0.0064	0.0034
0.599	0.01	4.86	-0.0087	-0.1960	0.0036	-0.0087	0.0062	0.0036
0.600	0.01	5.48	-0.0090	-0.2286	0.0038	-0.0090	0.0050	0.0038

Table 14. Continued

(a) Concluded

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
0.201	-0.01	1.01	-0.0219	0.0032	0.0002	-0.0219	0.0032	0.0002
0.200	0.00	1.53	-0.0156	-0.2896	0.0016	-0.0155	-0.0016	0.0016
0.200	0.00	2.02	-0.0199	-0.5097	0.0038	-0.0199	0.0042	0.0038
0.199	0.01	2.69	-0.0286	-0.8199	0.0075	-0.0287	0.0080	0.0075
0.200	0.01	3.25	-0.0329	-1.0660	0.0086	-0.0331	0.0068	0.0086
0.199	0.02	3.98	-0.0427	-1.4130	0.0149	-0.0432	0.0073	0.0149
0.200	0.01	1.00	-0.0094	0.0021	0.0015	-0.0094	0.0021	0.0015
0.198	4.03	1.00	0.0031	-0.0009	-0.0003	0.0031	-0.0009	-0.0003
0.200	7.98	1.00	0.0023	0.0065	-0.0024	0.0023	0.0065	-0.0024
0.201	12.02	1.00	0.0123	0.0066	-0.0077	0.0123	0.0066	-0.0077
0.198	14.50	1.00	0.0255	0.0090	-0.0136	0.0255	0.0090	-0.0136
0.199	0.02	3.24	-0.0356	-1.0790	0.0115	-0.0359	0.0026	0.0115
0.200	4.01	3.25	0.0661	-1.0570	0.0077	-0.0090	0.0135	0.0077
0.200	7.98	3.25	0.1399	-1.0550	0.0057	-0.0096	0.0107	0.0057
0.200	12.02	3.26	0.2320	-1.0470	-0.0050	0.0068	0.0110	-0.0050
0.200	14.52	3.24	0.2834	-1.0220	-0.0090	0.0138	0.0183	-0.0090

Table 14. Continued

(b) Lateral characteristics

MACH	ALPHA	NPR	CR	CN	CY	CRA	CNA	CYA
1.199	0.01	0.87	0.0001	-0.0001	0.0023	0.0001	-0.0001	0.0023
1.200	0.02	2.16	0.0002	-0.0003	0.0024	0.0002	-0.0003	0.0024
1.199	0.02	3.18	0.0001	-0.0003	0.0027	0.0001	-0.0003	0.0027
1.200	0.02	4.03	0.0001	-0.0003	0.0026	0.0001	-0.0003	0.0026
1.200	0.01	5.53	0.0001	-0.0004	0.0026	0.0001	-0.0004	0.0026
1.201	0.01	7.34	0.0001	-0.0004	0.0030	0.0001	-0.0004	0.0030
1.198	0.01	8.00	0.0001	-0.0005	0.0028	0.0001	-0.0005	0.0028
0.900	-0.01	1.05	0.0003	-0.0008	0.0046	0.0003	-0.0008	0.0046
0.900	0.02	2.00	0.0002	-0.0011	0.0056	0.0002	-0.0011	0.0056
0.901	0.01	3.23	0.0002	-0.0012	0.0057	0.0002	-0.0012	0.0057
0.900	0.01	4.04	0.0002	-0.0012	0.0063	0.0002	-0.0012	0.0063
0.901	0.02	5.02	0.0001	-0.0012	0.0062	0.0001	-0.0012	0.0062
0.901	0.01	5.96	0.0001	-0.0011	0.0056	0.0001	-0.0011	0.0056
0.900	0.01	7.04	0.0001	-0.0011	0.0058	0.0001	-0.0011	0.0058
0.900	-0.02	1.05	0.0003	-0.0008	0.0045	0.0003	-0.0008	0.0045
0.903	4.01	1.04	-0.0005	-0.0006	0.0019	-0.0005	-0.0006	0.0019
0.899	7.99	1.03	-0.0006	0.0005	-0.0029	-0.0006	0.0005	-0.0029
0.902	12.01	1.02	-0.0007	0.0017	-0.0089	-0.0007	0.0017	-0.0089
0.903	0.01	5.97	0.0001	-0.0011	0.0052	0.0001	-0.0011	0.0052
0.901	4.02	6.07	-0.0005	-0.0005	0.0020	-0.0005	-0.0005	0.0020
0.900	7.99	5.95	-0.0009	0.0005	-0.0024	-0.0009	0.0005	-0.0024
0.900	12.01	5.97	-0.0010	0.0018	-0.0084	-0.0010	0.0018	-0.0084
0.800	0.03	1.06	0.0002	-0.0014	0.0056	0.0002	-0.0014	0.0056
0.799	0.01	2.02	0.0001	-0.0014	0.0057	0.0001	-0.0014	0.0057
0.799	0.02	3.23	0.0001	-0.0014	0.0062	0.0001	-0.0014	0.0062
0.802	0.02	4.51	0.0000	-0.0014	0.0061	0.0000	-0.0014	0.0061
0.798	0.02	5.54	0.0001	-0.0013	0.0057	0.0001	-0.0013	0.0057
0.601	-0.01	1.02	0.0001	-0.0012	0.0053	0.0001	-0.0012	0.0053
0.601	0.00	2.01	0.0001	-0.0013	0.0055	0.0001	-0.0013	0.0055
0.601	0.01	3.27	0.0000	-0.0013	0.0054	0.0000	-0.0013	0.0054
0.600	0.02	3.97	0.0001	-0.0012	0.0055	0.0001	-0.0012	0.0055
0.601	0.00	4.78	0.0000	-0.0012	0.0055	0.0000	-0.0012	0.0055
0.601	0.02	5.61	0.0000	-0.0012	0.0055	0.0000	-0.0012	0.0055
0.600	-0.01	1.04	0.0001	-0.0012	0.0055	0.0001	-0.0012	0.0055
0.601	4.01	1.04	-0.0003	-0.0010	0.0031	-0.0003	-0.0010	0.0031
0.600	7.99	1.03	-0.0008	-0.0007	0.0033	-0.0008	-0.0007	0.0033
0.599	12.00	1.03	-0.0011	0.0000	0.0000	-0.0011	0.0000	0.0000
0.598	0.01	4.82	-0.0001	-0.0012	0.0055	-0.0001	-0.0012	0.0055
0.600	4.02	4.78	-0.0005	-0.0009	0.0033	-0.0005	-0.0009	0.0033
0.601	8.00	4.82	-0.0010	-0.0004	0.0024	-0.0010	-0.0004	0.0024
0.600	11.99	4.78	-0.0014	0.0003	-0.0003	-0.0014	0.0003	-0.0003
0.597	0.01	1.03	0.0001	-0.0014	0.0056	0.0001	-0.0014	0.0056
0.599	0.02	2.03	0.0001	-0.0015	0.0056	0.0001	-0.0015	0.0056
0.600	0.01	3.25	0.0000	-0.0014	0.0056	0.0000	-0.0014	0.0056
0.599	0.02	4.02	-0.0001	-0.0014	0.0056	-0.0001	-0.0014	0.0056
0.599	0.01	4.86	0.0000	-0.0013	0.0056	0.0000	-0.0013	0.0056
0.600	0.01	5.48	-0.0001	-0.0013	0.0057	-0.0001	-0.0013	0.0057

Table 14. Concluded

(b) Concluded

MACH	ALPHA	NPR	CR	CN	CY	CRA	CNA	CYA
0.201	-0.01	1.01	0.0004	-0.0009	-0.0005	0.0004	-0.0009	-0.0005
0.200	0.00	1.53	0.0004	-0.0017	0.0017	0.0004	-0.0017	0.0017
0.200	0.00	2.02	0.0004	-0.0018	0.0029	0.0004	-0.0018	0.0029
0.199	0.01	2.69	0.0005	-0.0016	0.0072	0.0005	-0.0016	0.0072
0.200	0.01	3.25	0.0004	-0.0014	0.0093	0.0004	-0.0014	0.0093
0.199	0.02	3.98	-0.0001	-0.0012	0.0139	-0.0001	-0.0012	0.0139
0.200	0.01	1.00	-0.0001	-0.0016	0.0167	-0.0001	-0.0016	0.0167
0.198	4.03	1.00	-0.0012	-0.0009	0.0095	-0.0012	-0.0009	0.0095
0.200	7.98	1.00	-0.0015	-0.0010	0.0189	-0.0015	-0.0010	0.0189
0.201	12.02	1.00	-0.0014	-0.0005	0.0068	-0.0014	-0.0005	0.0068
0.198	14.50	1.00	-0.0014	-0.0006	0.0057	-0.0014	-0.0006	0.0057
0.199	0.02	3.24	-0.0001	-0.0018	0.0155	-0.0001	-0.0018	0.0155
0.200	4.01	3.25	-0.0016	-0.0016	0.0171	-0.0016	-0.0016	0.0171
0.200	7.98	3.25	-0.0015	-0.0015	0.0142	-0.0015	-0.0015	0.0142
0.200	12.02	3.26	-0.0019	-0.0006	0.0044	-0.0019	-0.0006	0.0044
0.200	14.52	3.24	-0.0028	-0.0008	0.0048	-0.0028	-0.0008	0.0048

Table 15. Aerodynamic Characteristics for Standard Nozzle With $\theta = 0^\circ$,
 $\delta_{v,p,l} = 20^\circ$, $\delta_{v,p,r} = 20^\circ$, and $\beta = 5^\circ$

(a) Longitudinal characteristics

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
1.200	-0.01	0.77	0.0079	0.0240	-0.0103	0.0079	0.0240	-0.0103
1.199	-0.02	1.98	0.0078	0.0087	-0.0112	0.0023	0.0201	-0.0061
1.200	0.01	3.20	0.0195	-0.0018	-0.0217	0.0090	0.0224	-0.0122
1.198	-0.01	4.02	0.0244	-0.0107	-0.0259	0.0108	0.0234	-0.0138
1.200	-0.03	5.49	0.0312	-0.0273	-0.0318	0.0125	0.0240	-0.0157
1.199	-0.02	7.32	0.0375	-0.0501	-0.0372	0.0124	0.0228	-0.0159
1.200	-0.03	7.98	0.0390	-0.0586	-0.0388	0.0115	0.0221	-0.0157
0.897	0.01	0.94	-0.0041	0.0117	0.0005	-0.0041	0.0117	0.0005
0.899	0.01	1.98	0.0179	-0.0075	-0.0189	0.0082	0.0127	-0.0099
0.900	0.01	3.21	0.0233	-0.0321	-0.0236	0.0045	0.0112	-0.0066
0.900	-0.03	4.03	0.0350	-0.0475	-0.0334	0.0110	0.0130	-0.0120
0.902	-0.03	4.98	0.0441	-0.0669	-0.0415	0.0141	0.0135	-0.0154
0.904	-0.04	6.00	0.0538	-0.0876	-0.0488	0.0177	0.0135	-0.0178
0.900	-0.03	7.01	0.0633	-0.1091	-0.0564	0.0206	0.0140	-0.0201
0.900	0.01	0.98	-0.0049	0.0116	0.0007	-0.0049	0.0116	0.0007
0.897	4.01	0.97	0.0022	0.0134	-0.0042	0.0022	0.0134	-0.0042
0.898	7.99	0.95	0.0089	0.0164	-0.0072	0.0089	0.0164	-0.0072
0.897	11.98	0.92	0.0196	0.0216	-0.0138	0.0196	0.0216	-0.0138
0.900	-0.03	6.01	0.0542	-0.0888	-0.0492	0.0177	0.0135	-0.0179
0.899	3.99	6.01	0.0687	-0.0826	-0.0546	0.0251	0.0170	-0.0232
0.899	7.99	6.00	0.0833	-0.0744	-0.0595	0.0328	0.0217	-0.0281
0.898	11.97	6.01	0.0989	-0.0643	-0.0663	0.0417	0.0284	-0.0348
0.800	0.00	0.96	0.0008	0.0114	-0.0039	0.0008	0.0114	-0.0039
0.801	0.01	1.97	0.0305	-0.0122	-0.0293	0.0185	0.0131	-0.0181
0.798	0.01	3.18	0.0364	-0.0434	-0.0333	0.0127	0.0110	-0.0119
0.799	-0.04	4.53	0.0562	-0.0772	-0.0506	0.0217	0.0132	-0.0202
0.799	-0.04	5.47	0.0662	-0.1016	-0.0587	0.0242	0.0137	-0.0224
0.600	-0.02	0.99	0.0159	0.0110	-0.0163	0.0159	0.0110	-0.0163
0.600	0.01	1.96	0.0594	-0.0300	-0.0515	0.0383	0.0144	-0.0318
0.600	0.00	3.21	0.0684	-0.0866	-0.0603	0.0261	0.0107	-0.0221
0.599	-0.03	3.98	0.0873	-0.1229	-0.0757	0.0335	0.0121	-0.0277
0.600	-0.04	4.78	0.0980	-0.1602	-0.0861	0.0333	0.0118	-0.0294
0.599	-0.04	5.49	0.1111	-0.1938	-0.0948	0.0363	0.0120	-0.0300
0.600	0.01	1.01	0.0154	0.0106	-0.0156	0.0154	0.0106	-0.0156
0.599	4.01	1.01	0.0293	0.0142	-0.0246	0.0293	0.0142	-0.0246
0.599	7.97	1.00	0.0354	0.0201	-0.0293	0.0354	0.0201	-0.0293
0.599	12.00	0.98	0.0361	0.0257	-0.0285	0.0361	0.0257	-0.0285
0.600	-0.04	4.81	0.0983	-0.1614	-0.0861	0.0331	0.0121	-0.0291
0.600	3.99	4.78	0.1184	-0.1509	-0.0908	0.0416	0.0163	-0.0340
0.599	7.99	4.78	0.1392	-0.1392	-0.0967	0.0507	0.0228	-0.0398
0.598	11.98	4.78	0.1604	-0.1246	-0.1046	0.0604	0.0314	-0.0474

Table 15. Continued

(a) Concluded

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
0.199	0.01	1.00	0.0094	0.0081	-0.0240	0.0094	0.0081	-0.0240
0.199	-0.01	1.51	0.1298	-0.2235	-0.1244	0.0375	0.0108	-0.0348
0.200	-0.02	2.03	0.2412	-0.3972	-0.2292	0.0344	0.0315	-0.0365
0.200	-0.04	2.63	0.3460	-0.6404	-0.3195	0.0470	0.0182	-0.0441
0.200	-0.02	3.18	0.4072	-0.8588	-0.3562	0.0319	0.0041	-0.0166
0.200	-0.03	3.99	0.5139	-1.1920	-0.4571	0.0326	0.0170	-0.0278
0.198	0.02	1.00	0.0070	0.0077	-0.0215	0.0070	0.0077	-0.0215
0.198	4.01	1.00	0.0316	0.0098	-0.0256	0.0316	0.0098	-0.0256
0.198	7.99	1.00	0.0305	0.0191	-0.0289	0.0305	0.0191	-0.0289
0.198	12.01	1.00	0.0562	0.0252	-0.0357	0.0562	0.0252	-0.0357
0.198	14.51	1.00	0.0517	0.0339	-0.0401	0.0517	0.0339	-0.0401
0.199	-0.03	3.20	0.4121	-0.8723	-0.3602	0.0309	0.0055	-0.0155
0.200	4.01	3.20	0.4701	-0.8350	-0.3620	0.0303	0.0094	-0.0190
0.200	8.01	3.20	0.5328	-0.7964	-0.3675	0.0352	0.0155	-0.0247
0.198	12.00	3.20	0.6185	-0.7617	-0.3784	0.0571	0.0255	-0.0301
0.198	14.62	3.20	0.6726	-0.7257	-0.3856	0.0744	0.0367	-0.0365

Table 15. Continued

(b) Lateral characteristics

MACH	ALPHA	NPR	CR	CN	CY	CRA	CNA	CYA
1.200	-0.01	0.77	0.0000	0.0000	0.0017	0.0000	0.0000	0.0017
1.199	-0.02	1.98	0.0001	-0.0001	0.0018	0.0001	-0.0001	0.0018
1.200	0.01	3.20	-0.0001	0.0001	0.0020	-0.0001	0.0001	0.0020
1.198	-0.01	4.02	-0.0001	0.0003	0.0021	-0.0001	0.0003	0.0021
1.200	-0.03	5.49	0.0001	0.0003	0.0021	0.0001	0.0003	0.0021
1.199	-0.02	7.32	0.0001	0.0003	0.0028	0.0001	0.0003	0.0028
1.200	-0.03	7.98	0.0001	0.0003	0.0033	0.0001	0.0003	0.0033
0.897	0.01	0.94	0.0000	-0.0006	0.0032	0.0000	-0.0006	0.0032
0.899	0.01	1.98	0.0001	-0.0004	0.0030	0.0001	-0.0004	0.0030
0.900	0.01	3.21	0.0001	-0.0004	0.0031	0.0001	-0.0004	0.0031
0.900	-0.03	4.03	0.0002	-0.0002	0.0043	0.0002	-0.0002	0.0043
0.902	-0.03	4.98	0.0002	-0.0001	0.0044	0.0002	-0.0001	0.0044
0.904	-0.04	6.00	0.0002	0.0000	0.0043	0.0002	0.0000	0.0043
0.900	-0.03	7.01	0.0003	0.0001	0.0041	0.0003	0.0001	0.0041
0.900	0.01	0.98	0.0000	-0.0006	0.0031	0.0000	-0.0006	0.0031
0.897	4.01	0.97	-0.0006	0.0000	-0.0007	-0.0006	0.0000	-0.0007
0.898	7.99	0.95	-0.0008	0.0009	-0.0052	-0.0008	0.0009	-0.0052
0.897	11.98	0.92	-0.0008	0.0013	-0.0087	-0.0008	0.0013	-0.0087
0.900	-0.03	6.01	0.0002	0.0001	0.0042	0.0002	0.0001	0.0042
0.899	3.99	6.01	-0.0004	0.0008	0.0009	-0.0004	0.0008	0.0009
0.899	7.99	6.00	-0.0007	0.0019	-0.0037	-0.0007	0.0019	-0.0037
0.898	11.97	6.01	-0.0008	0.0029	-0.0095	-0.0008	0.0029	-0.0095
0.800	0.00	0.96	0.0000	-0.0006	0.0021	0.0000	-0.0006	0.0021
0.801	0.01	1.97	0.0001	-0.0001	0.0022	0.0001	-0.0001	0.0022
0.798	0.01	3.18	0.0000	-0.0001	0.0032	0.0000	-0.0001	0.0032
0.799	-0.04	4.53	0.0001	0.0001	0.0038	0.0001	0.0001	0.0038
0.799	-0.04	5.47	0.0001	0.0002	0.0041	0.0001	0.0002	0.0041
0.600	-0.02	0.99	0.0002	-0.0002	0.0015	0.0002	-0.0002	0.0015
0.600	0.01	1.96	-0.0002	0.0003	0.0020	-0.0002	0.0003	0.0020
0.600	0.00	3.21	-0.0003	0.0002	0.0026	-0.0003	0.0002	0.0026
0.599	-0.03	3.98	-0.0001	0.0004	0.0042	-0.0001	0.0004	0.0042
0.600	-0.04	4.78	-0.0001	0.0005	0.0046	-0.0001	0.0005	0.0046
0.599	-0.04	5.49	0.0000	0.0006	0.0043	0.0000	0.0006	0.0043
0.600	0.01	1.01	-0.0006	-0.0006	0.0030	-0.0006	-0.0006	0.0030
0.599	4.01	1.01	-0.0007	-0.0004	0.0004	-0.0007	-0.0004	0.0004
0.599	7.97	1.00	-0.0012	-0.0003	-0.0003	-0.0012	-0.0003	-0.0003
0.599	12.00	0.98	-0.0009	0.0006	-0.0041	-0.0009	0.0006	-0.0041
0.600	-0.04	4.81	-0.0001	0.0006	0.0045	-0.0001	0.0006	0.0045
0.600	3.99	4.78	-0.0006	0.0008	0.0027	-0.0006	0.0008	0.0027
0.599	7.99	4.78	-0.0010	0.0011	0.0022	-0.0010	0.0011	0.0022
0.598	11.98	4.78	-0.0013	0.0014	-0.0002	-0.0013	0.0014	-0.0002

Table 15. Concluded

(b) Concluded

MACH	ALPHA	NPR	CR	CN	CY	CRA	CNA	CYA
0.199	0.01	1.00	-0.0015	-0.0003	-0.0013	-0.0015	-0.0003	-0.0013
0.199	-0.01	1.51	-0.0012	0.0003	-0.0011	-0.0012	0.0003	-0.0011
0.200	-0.02	2.03	-0.0008	0.0008	-0.0015	-0.0008	0.0008	-0.0015
0.200	-0.04	2.63	-0.0005	0.0018	-0.0012	-0.0005	0.0018	-0.0012
0.200	-0.02	3.18	-0.0002	0.0028	0.0104	-0.0002	0.0028	0.0104
0.200	-0.03	3.99	0.0004	0.0037	0.0143	0.0004	0.0037	0.0143
0.198	0.02	1.00	0.0002	-0.0004	-0.0020	0.0002	-0.0004	-0.0020
0.198	4.01	1.00	-0.0015	-0.0018	0.0014	-0.0015	-0.0018	0.0014
0.198	7.99	1.00	-0.0014	-0.0033	0.0056	-0.0014	-0.0033	0.0056
0.198	12.01	1.00	-0.0011	-0.0042	0.0020	-0.0011	-0.0042	0.0020
0.198	14.51	1.00	-0.0010	-0.0050	0.0032	-0.0010	-0.0050	0.0032
0.199	-0.03	3.20	-0.0002	0.0027	0.0152	-0.0002	0.0027	0.0152
0.200	4.01	3.20	-0.0006	0.0013	0.0113	-0.0006	0.0013	0.0113
0.200	8.01	3.20	-0.0006	0.0004	0.0185	-0.0006	0.0004	0.0185
0.198	12.00	3.20	-0.0007	-0.0007	0.0015	-0.0007	-0.0007	0.0015
0.198	14.62	3.20	-0.0016	-0.0019	0.0031	-0.0016	-0.0019	0.0031

Table 16. Aerodynamic Characteristics for Standard Nozzle With $\theta = 0^\circ$,
 $\delta_{v,p,l} = -20^\circ$, $\delta_{v,p,r} = 20^\circ$, and $\beta = 5^\circ$

(a) Longitudinal characteristics

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
1.199	-0.02	0.77	-0.0019	0.0233	-0.0016	-0.0019	0.0233	-0.0016
1.203	0.01	3.21	-0.0008	-0.0022	-0.0029	-0.0008	0.0218	-0.0029
1.203	0.00	3.99	-0.0008	-0.0103	-0.0028	-0.0008	0.0230	-0.0028
1.202	0.01	5.49	-0.0016	-0.0279	-0.0019	-0.0017	0.0229	-0.0019
1.202	0.02	7.31	-0.0030	-0.0505	-0.0011	-0.0030	0.0217	-0.0011
1.202	0.01	8.05	-0.0029	-0.0594	-0.0010	-0.0029	0.0215	-0.0010
1.201	0.01	8.04	-0.0027	-0.0594	-0.0011	-0.0028	0.0215	-0.0011
0.902	0.02	0.94	-0.0051	0.0119	0.0003	-0.0051	0.0119	0.0003
0.902	0.09	2.00	-0.0043	-0.0084	0.0007	-0.0043	0.0116	0.0007
0.902	0.04	3.20	-0.0047	-0.0323	0.0010	-0.0047	0.0104	0.0010
0.902	0.02	4.02	-0.0050	-0.0475	0.0010	-0.0050	0.0120	0.0009
0.901	0.01	4.96	-0.0046	-0.0666	0.0009	-0.0046	0.0128	0.0009
0.900	0.03	5.99	-0.0035	-0.0883	0.0007	-0.0036	0.0129	0.0007
0.900	0.03	7.01	-0.0042	-0.1094	0.0005	-0.0043	0.0131	0.0005
0.902	-0.01	0.97	-0.0051	0.0112	0.0005	-0.0051	0.0112	0.0005
0.904	4.02	0.96	0.0026	0.0133	-0.0049	0.0026	0.0133	-0.0049
0.901	8.01	0.95	0.0087	0.0158	-0.0066	0.0087	0.0158	-0.0066
0.903	11.65	0.93	0.0122	0.0187	-0.0077	0.0122	0.0187	-0.0077
0.899	0.02	5.98	-0.0037	-0.0886	0.0007	-0.0038	0.0126	0.0007
0.901	4.02	6.03	0.0095	-0.0875	-0.0037	0.0023	0.0142	-0.0037
0.900	8.02	6.03	0.0220	-0.0847	-0.0056	0.0077	0.0164	-0.0056
0.897	11.99	6.05	0.0377	-0.0807	-0.0100	0.0163	0.0201	-0.0100
0.804	0.01	0.95	-0.0028	0.0109	-0.0013	-0.0028	0.0109	-0.0013
0.803	0.00	2.00	-0.0013	-0.0134	-0.0019	-0.0013	0.0119	-0.0019
0.803	0.01	3.18	-0.0023	-0.0429	-0.0009	-0.0023	0.0103	-0.0009
0.803	-0.01	4.53	-0.0011	-0.0761	-0.0012	-0.0011	0.0126	-0.0012
0.802	0.01	5.50	-0.0010	-0.1015	-0.0012	-0.0011	0.0131	-0.0012
0.600	0.00	0.98	-0.0001	0.0106	-0.0027	-0.0001	0.0106	-0.0027
0.601	0.00	2.01	-0.0044	-0.0330	-0.0005	-0.0044	0.0126	-0.0005
0.602	-0.01	3.23	0.0005	-0.0872	-0.0035	0.0005	0.0096	-0.0035
0.602	0.03	4.01	-0.0014	-0.1223	-0.0015	-0.0015	0.0112	-0.0015
0.603	0.01	4.80	-0.0043	-0.1577	0.0002	-0.0043	0.0123	0.0002
0.604	0.01	5.49	-0.0040	-0.1908	0.0008	-0.0041	0.0110	0.0008
0.599	0.01	0.99	-0.0021	0.0106	-0.0023	-0.0021	0.0106	-0.0023
0.600	4.01	1.00	0.0097	0.0114	-0.0107	0.0097	0.0114	-0.0107
0.600	8.02	0.99	0.0168	0.0157	-0.0131	0.0168	0.0157	-0.0131
0.599	12.00	1.00	0.0098	0.0167	-0.0055	0.0098	0.0167	-0.0055
0.600	-0.01	4.78	-0.0037	-0.1585	0.0006	-0.0037	0.0119	0.0006
0.600	4.01	4.81	0.0133	-0.1588	-0.0018	0.0013	0.0127	-0.0018
0.599	8.02	4.84	0.0314	-0.1577	-0.0047	0.0072	0.0144	-0.0047
0.599	11.97	4.86	0.0527	-0.1520	-0.0099	0.0164	0.0192	-0.0099

Table 16. Continued

(a) Concluded

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
0.201	0.01	0.99	-0.0037	0.0009	-0.0006	-0.0037	0.0009	-0.0006
0.202	0.03	1.54	-0.0196	-0.2281	0.0006	-0.0197	0.0060	0.0006
0.203	0.02	1.95	-0.0111	-0.3608	-0.0005	-0.0112	0.0185	-0.0005
0.203	0.02	2.62	-0.0021	-0.6067	0.0008	-0.0023	0.0172	0.0008
0.204	0.00	3.23	-0.0075	-0.8451	0.0031	-0.0076	0.0008	0.0031
0.203	0.01	4.04	-0.0076	-1.1730	0.0054	-0.0078	0.0117	0.0054
0.201	-0.01	1.00	-0.0022	0.0016	0.0013	-0.0022	0.0016	0.0013
0.201	4.00	1.00	-0.0049	0.0082	-0.0007	-0.0049	0.0082	-0.0007
0.201	8.02	1.00	0.0026	0.0072	-0.0028	0.0026	0.0072	-0.0028
0.201	11.99	1.00	0.0194	0.0153	-0.0076	0.0194	0.0153	-0.0076
0.202	14.49	1.00	0.0203	0.0181	-0.0113	0.0203	0.0181	-0.0113
0.202	0.02	3.21	-0.0080	-0.8506	0.0064	-0.0083	-0.0001	0.0064
0.203	4.02	3.21	0.0545	-0.8424	0.0038	-0.0049	0.0042	0.0038
0.203	8.01	3.20	0.1315	-0.8265	-0.0009	0.0140	0.0084	-0.0009
0.203	12.02	3.20	0.1921	-0.8139	-0.0056	0.0167	0.0100	-0.0056
0.203	14.50	3.20	0.2457	-0.8011	-0.0096	0.0344	0.0161	-0.0096

Table 16. Continued

(b) Lateral characteristics

MACH	ALPHA	NPR	CR	CN	CY	CRA	CNA	CYA
1.199	-0.02	0.77	-0.0007	-0.0001	0.0029	-0.0007	-0.0001	0.0029
1.203	0.01	3.21	-0.0015	0.0000	0.0025	-0.0008	0.0000	0.0025
1.203	0.00	3.99	-0.0017	0.0001	0.0022	-0.0008	0.0001	0.0022
1.202	0.01	5.49	-0.0022	0.0001	0.0023	-0.0009	0.0001	0.0023
1.202	0.02	7.31	-0.0026	0.0000	0.0033	-0.0008	0.0000	0.0033
1.202	0.01	8.05	-0.0028	0.0000	0.0036	-0.0008	0.0000	0.0036
1.201	0.01	8.04	-0.0028	0.0000	0.0036	-0.0008	0.0000	0.0036
0.902	0.02	0.94	0.0000	-0.0007	0.0034	0.0000	-0.0007	0.0034
0.902	0.09	2.00	-0.0011	-0.0007	0.0042	-0.0004	-0.0007	0.0042
0.902	0.04	3.20	-0.0015	-0.0007	0.0042	-0.0003	-0.0007	0.0042
0.902	0.02	4.02	-0.0021	-0.0006	0.0043	-0.0004	-0.0006	0.0043
0.901	0.01	4.96	-0.0026	-0.0006	0.0046	-0.0005	-0.0006	0.0046
0.900	0.03	5.99	-0.0031	-0.0006	0.0046	-0.0005	-0.0006	0.0046
0.900	0.03	7.01	-0.0036	-0.0005	0.0049	-0.0005	-0.0005	0.0049
0.902	-0.01	0.97	0.0000	-0.0006	0.0035	0.0000	-0.0006	0.0035
0.904	4.02	0.96	-0.0005	-0.0004	0.0006	-0.0005	-0.0004	0.0006
0.901	8.01	0.95	-0.0009	0.0002	-0.0026	-0.0009	0.0002	-0.0026
0.903	11.65	0.93	-0.0010	0.0010	-0.0076	-0.0010	0.0010	-0.0076
0.899	0.02	5.98	-0.0031	-0.0006	0.0047	-0.0006	-0.0006	0.0047
0.901	4.02	6.03	-0.0037	-0.0003	0.0024	-0.0011	-0.0003	0.0024
0.900	8.02	6.03	-0.0042	0.0003	-0.0013	-0.0016	0.0003	-0.0013
0.897	11.99	6.05	-0.0045	0.0012	-0.0061	-0.0019	0.0012	-0.0061
0.804	0.01	0.95	-0.0002	-0.0007	0.0032	-0.0002	-0.0007	0.0032
0.803	0.00	2.00	-0.0017	-0.0006	0.0035	-0.0009	-0.0006	0.0035
0.803	0.01	3.18	-0.0021	-0.0006	0.0034	-0.0005	-0.0006	0.0034
0.803	-0.01	4.53	-0.0032	-0.0006	0.0037	-0.0008	-0.0006	0.0037
0.802	0.01	5.50	-0.0037	-0.0005	0.0042	-0.0008	-0.0005	0.0042
0.600	0.00	0.98	-0.0004	-0.0006	0.0031	-0.0004	-0.0006	0.0031
0.601	0.00	2.01	-0.0034	-0.0005	0.0042	-0.0018	-0.0005	0.0042
0.602	-0.01	3.23	-0.0041	-0.0006	0.0046	-0.0013	-0.0006	0.0046
0.602	0.03	4.01	-0.0052	-0.0004	0.0050	-0.0015	-0.0004	0.0050
0.603	0.01	4.80	-0.0058	-0.0004	0.0052	-0.0013	-0.0004	0.0052
0.604	0.01	5.49	-0.0066	-0.0003	0.0055	-0.0013	-0.0003	0.0055
0.599	0.01	0.99	-0.0004	-0.0006	0.0033	-0.0004	-0.0006	0.0033
0.600	4.01	1.00	-0.0014	-0.0013	0.0040	-0.0014	-0.0013	0.0040
0.600	8.02	0.99	-0.0019	-0.0016	0.0045	-0.0019	-0.0016	0.0045
0.599	12.00	1.00	-0.0024	-0.0010	0.0018	-0.0024	-0.0010	0.0018
0.600	-0.01	4.78	-0.0058	-0.0004	0.0052	-0.0013	-0.0004	0.0052
0.600	4.01	4.81	-0.0066	-0.0008	0.0059	-0.0021	-0.0008	0.0059
0.599	8.02	4.84	-0.0069	-0.0013	0.0066	-0.0023	-0.0013	0.0066
0.599	11.97	4.86	-0.0074	-0.0015	0.0068	-0.0027	-0.0015	0.0068

Table 16. Concluded

(b) Concluded

MACH	ALPHA	NPR	CR	CN	CY	CRA	CNA	CYA
0.201	0.01	0.99	-0.0020	-0.0001	0.0021	-0.0020	-0.0001	0.0021
0.202	0.03	1.54	-0.0096	0.0000	0.0051	0.0000	0.0000	0.0051
0.203	0.02	1.95	-0.0153	0.0003	0.0061	-0.0019	0.0003	0.0061
0.203	0.02	2.62	-0.0229	0.0008	0.0089	-0.0033	0.0008	0.0089
0.204	0.00	3.23	-0.0267	0.0003	0.0119	-0.0016	0.0003	0.0119
0.203	0.01	4.04	-0.0347	0.0009	0.0149	-0.0019	0.0009	0.0149
0.201	-0.01	1.00	-0.0018	-0.0002	0.0020	-0.0018	-0.0002	0.0020
0.201	4.00	1.00	-0.0020	-0.0017	0.0040	-0.0020	-0.0017	0.0040
0.201	8.02	1.00	-0.0017	-0.0038	0.0060	-0.0017	-0.0038	0.0060
0.201	11.99	1.00	-0.0017	-0.0053	0.0076	-0.0017	-0.0053	0.0076
0.202	14.49	1.00	-0.0018	-0.0059	0.0075	-0.0018	-0.0059	0.0075
0.202	0.02	3.21	-0.0271	0.0001	0.0122	-0.0019	0.0001	0.0122
0.203	4.02	3.21	-0.0274	-0.0021	0.0157	-0.0022	-0.0021	0.0157
0.203	8.01	3.20	-0.0285	-0.0037	0.0167	-0.0035	-0.0037	0.0167
0.203	12.02	3.20	-0.0286	-0.0058	0.0190	-0.0036	-0.0058	0.0190
0.203	14.50	3.20	-0.0284	-0.0069	0.0189	-0.0033	-0.0069	0.0189

Table 17. Aerodynamic Characteristics for Standard Nozzle With $\theta = 30^\circ$,
 $\delta_{v,p,l} = 0^\circ$, $\delta_{v,p,r} = 0^\circ$, and $\beta = 0^\circ$

(a) Longitudinal characteristics

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
1.200	0.00	0.84	-0.0088	0.0218	0.0041	-0.0088	0.0218	0.0041
1.197	0.01	2.01	-0.0096	0.0048	0.0041	-0.0096	0.0191	0.0041
1.200	0.00	3.22	-0.0078	-0.0103	0.0033	-0.0078	0.0193	0.0033
1.199	-0.01	4.00	-0.0081	-0.0202	0.0033	-0.0081	0.0194	0.0033
1.199	0.01	5.52	-0.0087	-0.0411	0.0039	-0.0087	0.0178	0.0039
1.200	0.01	7.30	-0.0092	-0.0651	0.0040	-0.0092	0.0164	0.0040
1.199	0.01	8.01	-0.0094	-0.0755	0.0039	-0.0094	0.0153	0.0039
0.899	0.00	1.02	-0.0121	0.0112	0.0058	-0.0121	0.0112	0.0058
0.904	-0.01	2.01	-0.0064	-0.0165	0.0006	-0.0064	0.0086	0.0006
0.902	-0.01	3.18	-0.0066	-0.0426	0.0001	-0.0066	0.0089	0.0001
0.900	-0.01	3.98	-0.0066	-0.0618	-0.0001	-0.0066	0.0080	-0.0001
0.900	-0.01	4.98	-0.0054	-0.0847	-0.0002	-0.0054	0.0077	-0.0002
0.901	-0.01	6.01	-0.0059	-0.1084	-0.0001	-0.0059	0.0071	-0.0001
0.900	0.00	6.99	-0.0062	-0.1311	-0.0002	-0.0061	0.0067	-0.0002
0.899	0.00	1.02	-0.0122	0.0107	0.0058	-0.0122	0.0107	0.0058
0.902	4.01	1.02	-0.0076	0.0106	0.0026	-0.0076	0.0106	0.0026
0.901	7.99	1.04	0.0069	0.0124	-0.0078	0.0069	0.0124	-0.0078
0.899	11.49	1.04	0.0149	0.0155	-0.0122	0.0149	0.0155	-0.0122
0.899	0.02	5.99	-0.0059	-0.1084	-0.0001	-0.0059	0.0069	-0.0001
0.901	4.04	5.98	0.0061	-0.1072	-0.0024	-0.0020	0.0074	-0.0024
0.897	7.98	5.99	0.0223	-0.1056	-0.0064	0.0062	0.0092	-0.0064
0.900	11.00	5.95	0.0355	-0.1005	-0.0108	0.0137	0.0117	-0.0108
0.803	0.01	1.03	-0.0075	0.0068	0.0020	-0.0075	0.0068	0.0020
0.803	0.01	2.00	-0.0052	-0.0254	0.0000	-0.0052	0.0059	0.0000
0.801	0.01	3.21	-0.0051	-0.0602	-0.0003	-0.0052	0.0057	-0.0003
0.801	0.02	4.51	-0.0060	-0.0972	0.0000	-0.0060	0.0061	0.0000
0.800	0.02	5.50	-0.0042	-0.1260	0.0000	-0.0043	0.0056	0.0000
0.602	0.02	1.02	-0.0085	0.0060	0.0013	-0.0085	0.0060	0.0013
0.603	0.01	2.01	-0.0069	-0.0501	0.0003	-0.0069	0.0059	0.0003
0.604	0.02	3.21	-0.0075	-0.1108	0.0008	-0.0075	0.0052	0.0008
0.599	0.00	4.00	-0.0066	-0.1534	0.0008	-0.0066	0.0054	0.0008
0.599	0.02	4.83	-0.0069	-0.1963	0.0015	-0.0070	0.0049	0.0015
0.599	0.02	5.50	-0.0076	-0.2302	0.0016	-0.0076	0.0050	0.0016
0.599	-0.01	1.03	-0.0085	0.0055	0.0013	-0.0085	0.0055	0.0013
0.600	4.01	1.03	-0.0049	0.0054	0.0005	-0.0049	0.0054	0.0005
0.600	7.98	1.03	-0.0007	0.0072	-0.0028	-0.0007	0.0072	-0.0028
0.600	11.18	1.03	0.0076	0.0087	-0.0072	0.0076	0.0087	-0.0072
0.601	0.02	4.85	-0.0067	-0.1952	0.0015	-0.0067	0.0055	0.0015
0.601	4.01	4.79	0.0074	-0.1925	0.0000	-0.0065	0.0050	0.0000
0.600	7.99	4.78	0.0294	-0.1894	-0.0041	0.0020	0.0060	-0.0041
0.600	12.00	4.78	0.0553	-0.1849	-0.0109	0.0141	0.0088	-0.0109
0.601	19.99	1.04	0.0345	0.0160	-0.0207	0.0345	0.0160	-0.0207
0.599	19.99	1.98	0.0573	-0.0333	-0.0242	0.0382	0.0194	-0.0242
0.599	20.00	3.21	0.0786	-0.0922	-0.0257	0.0380	0.0194	-0.0257
0.598	20.00	4.78	0.1092	-0.1683	-0.0272	0.0410	0.0192	-0.0272
0.602	20.00	5.50	0.1223	-0.1997	-0.0276	0.0428	0.0189	-0.0276

Table 17. Continued

(a) Concluded

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
0.200	0.00	0.99	-0.0017	0.0019	-0.0007	-0.0017	0.0019	-0.0007
0.203	0.00	1.54	-0.0168	-0.2880	-0.0003	-0.0168	-0.0012	-0.0003
0.200	0.01	2.04	-0.0258	-0.5208	0.0049	-0.0259	0.0023	0.0049
0.201	0.02	2.63	-0.0327	-0.7798	0.0074	-0.0329	0.0096	0.0074
0.201	0.00	3.37	-0.0397	-1.1120	0.0095	-0.0398	0.0097	0.0095
0.201	0.02	4.00	-0.0434	-1.3920	0.0131	-0.0439	0.0102	0.0131
0.200	-0.02	1.00	-0.0026	0.0015	0.0033	-0.0026	0.0015	0.0033
0.200	4.01	1.00	-0.0032	-0.0013	0.0030	-0.0032	-0.0013	0.0030
0.200	7.98	1.00	-0.0021	-0.0008	-0.0027	-0.0021	-0.0008	-0.0027
0.200	12.01	1.00	0.0073	0.0071	-0.0088	0.0073	0.0071	-0.0088
0.200	14.51	1.00	0.0200	0.0093	-0.0139	0.0200	0.0093	-0.0139
0.200	0.01	3.20	-0.0389	-1.0490	0.0121	-0.0391	0.0117	0.0121
0.200	4.01	3.18	0.0506	-1.0390	0.0100	-0.0228	0.0070	0.0100
0.200	7.99	3.16	0.1323	-1.0240	0.0020	-0.0117	0.0023	0.0020
0.199	12.01	3.21	0.2163	-1.0410	-0.0032	-0.0065	0.0063	-0.0032
0.199	14.49	3.19	0.2760	-1.0180	-0.0092	0.0091	0.0144	-0.0092
0.201	12.00	1.00	0.0028	0.0055	-0.0062	0.0028	0.0055	-0.0062
0.200	14.47	1.00	0.0196	0.0059	-0.0107	0.0196	0.0059	-0.0107
0.200	16.00	1.00	0.0253	0.0091	-0.0151	0.0253	0.0091	-0.0151
0.201	20.00	1.00	0.0385	0.0140	-0.0237	0.0385	0.0140	-0.0237
0.200	23.99	1.00	0.0464	0.0202	-0.0323	0.0464	0.0202	-0.0323
0.200	26.99	1.00	0.0669	0.0266	-0.0394	0.0669	0.0266	-0.0394
0.199	12.00	3.22	0.2163	-1.0420	0.0005	-0.0078	0.0120	0.0005
0.199	14.46	3.23	0.2824	-1.0260	-0.0043	0.0132	0.0173	-0.0043
0.199	16.01	3.25	0.3178	-1.0370	-0.0081	0.0162	0.0139	-0.0081
0.200	19.99	3.20	0.3835	-0.9851	-0.0184	0.0190	0.0169	-0.0184
0.199	23.99	3.21	0.4879	-0.9483	-0.0316	0.0511	0.0331	-0.0316
0.201	26.99	3.21	0.5357	-0.9028	-0.0399	0.0572	0.0366	-0.0399
0.199	20.01	1.01	0.0460	0.0164	-0.0234	0.0460	0.0164	-0.0234
0.200	20.00	2.01	0.2015	-0.4587	-0.0199	0.0242	0.0285	-0.0199
0.200	20.01	2.60	0.2919	-0.7238	-0.0169	0.0226	0.0158	-0.0169
0.200	20.01	3.18	0.3973	-0.9670	-0.0190	0.0375	0.0211	-0.0190
0.200	20.01	3.99	0.5197	-1.3200	-0.0180	0.0321	0.0189	-0.0180

Table 17. Continued

(b) Lateral characteristics

MACH	ALPHA	NPR	CR	CN	CY	CRA	CNA	CYA
1.200	0.00	0.84	0.0000	0.0000	0.0020	0.0000	0.0000	0.0020
1.197	0.01	2.01	0.0000	0.0000	0.0022	0.0000	0.0000	0.0022
1.200	0.00	3.22	0.0000	0.0000	0.0021	0.0000	0.0000	0.0021
1.199	-0.01	4.00	0.0000	0.0000	0.0018	0.0000	0.0000	0.0018
1.199	0.01	5.52	0.0000	0.0000	0.0020	0.0000	0.0000	0.0020
1.200	0.01	7.30	0.0000	0.0000	0.0019	0.0000	0.0000	0.0018
1.199	0.01	8.01	0.0000	0.0000	0.0018	0.0000	0.0000	0.0024
0.899	0.00	1.02	0.0000	0.0000	0.0024	0.0000	0.0000	0.0018
0.904	-0.01	2.01	0.0001	-0.0001	0.0018	0.0001	-0.0001	0.0018
0.902	-0.01	3.18	0.0000	-0.0001	0.0018	0.0000	-0.0001	0.0018
0.900	-0.01	3.98	0.0000	-0.0001	0.0017	0.0000	-0.0001	0.0017
0.900	-0.01	4.98	0.0000	-0.0001	0.0017	0.0000	-0.0001	0.0017
0.901	-0.01	6.01	0.0001	-0.0001	0.0017	0.0001	-0.0001	0.0018
0.900	0.00	6.99	0.0000	-0.0001	0.0018	0.0000	-0.0001	0.0018
0.899	0.00	1.02	0.0001	0.0001	0.0018	0.0001	0.0001	0.0018
0.902	4.01	1.02	-0.0001	-0.0002	0.0029	-0.0001	-0.0002	0.0029
0.901	7.99	1.04	-0.0001	-0.0003	0.0030	-0.0001	-0.0003	0.0030
0.899	11.49	1.04	-0.0001	-0.0002	0.0032	-0.0001	-0.0002	0.0032
0.899	0.02	5.99	0.0001	-0.0001	0.0016	0.0001	-0.0001	0.0016
0.901	4.04	5.98	0.0000	0.0000	0.0018	0.0000	0.0000	0.0018
0.897	7.98	5.99	0.0000	0.0001	0.0011	0.0000	0.0000	0.0017
0.900	11.00	5.95	0.0000	0.0000	0.0017	0.0000	0.0000	0.0019
0.803	0.01	1.03	0.0002	0.0000	0.0019	0.0002	0.0000	0.0019
0.803	0.01	2.00	0.0001	-0.0001	0.0019	0.0001	-0.0001	0.0019
0.801	0.01	3.21	0.0001	-0.0001	0.0019	0.0001	-0.0001	0.0019
0.801	0.02	4.51	0.0001	-0.0001	0.0019	0.0001	-0.0001	0.0019
0.800	0.02	5.50	0.0001	-0.0001	0.0018	0.0001	-0.0001	0.0018
0.602	0.02	1.02	0.0001	0.0000	0.0022	0.0001	0.0000	0.0022
0.603	0.01	2.01	0.0001	0.0000	0.0010	0.0001	0.0000	0.0010
0.604	0.02	3.21	0.0000	0.0000	0.0001	0.0000	0.0000	0.0001
0.599	0.00	4.00	0.0000	0.0000	0.0001	0.0000	0.0000	0.0001
0.599	0.02	4.83	0.0000	0.0000	0.0001	0.0000	0.0000	0.0001
0.599	0.02	5.50	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.599	-0.01	1.03	0.0002	0.0001	0.0001	0.0002	0.0001	0.0001
0.600	4.01	1.03	0.0002	0.0001	0.0000	0.0002	0.0003	-0.0001
0.600	7.98	1.03	0.0002	0.0003	-0.0001	0.0002	0.0002	0.0001
0.600	11.18	1.03	0.0002	0.0002	0.0001	0.0002	0.0000	0.0000
0.601	0.02	4.85	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
0.601	4.01	4.79	0.0000	0.0001	-0.0001	0.0000	0.0001	-0.0001
0.600	7.99	4.78	0.0000	0.0003	-0.0004	0.0000	0.0003	-0.0004
0.600	12.00	4.78	0.0000	0.0002	-0.0004	0.0000	0.0002	-0.0004
0.601	19.99	1.04	0.0001	0.0005	-0.0019	0.0001	0.0005	-0.0019
0.599	19.99	1.98	0.0001	0.0002	-0.0018	0.0001	0.0002	-0.0018
0.599	20.00	3.21	0.0001	0.0002	-0.0014	0.0001	0.0002	-0.0014
0.598	20.00	4.78	0.0001	0.0002	-0.0015	0.0001	0.0002	-0.0015
0.602	20.00	5.50	0.0001	0.0003	-0.0017	0.0001	0.0003	-0.0017

Table 17. Concluded

(b) Concluded

MACH	ALPHA	NPR	CR	CN	CY	CRA	CNA	CYA
0.200	0.00	0.99	0.0014	0.0007	-0.0021	0.0014	0.0007	-0.0021
0.203	0.00	1.54	0.0003	0.0000	-0.0013	0.0003	0.0000	-0.0013
0.200	0.01	2.04	-0.0002	0.0000	-0.0011	-0.0002	0.0000	-0.0011
0.201	0.02	2.63	-0.0002	-0.0001	-0.0010	-0.0002	-0.0001	-0.0010
0.201	0.00	3.37	-0.0001	0.0001	-0.0011	-0.0001	0.0001	-0.0011
0.201	0.02	4.00	0.0000	0.0000	-0.0023	0.0000	0.0000	-0.0023
0.200	-0.02	1.00	0.0012	0.0007	-0.0031	0.0012	0.0007	-0.0031
0.200	4.01	1.00	0.0007	0.0009	-0.0030	0.0007	0.0009	-0.0030
0.200	7.98	1.00	0.0014	0.0008	-0.0031	0.0014	0.0008	-0.0031
0.200	12.01	1.00	0.0011	0.0006	-0.0018	0.0011	0.0006	-0.0018
0.200	14.51	1.00	0.0013	0.0001	-0.0005	0.0013	0.0001	-0.0005
0.200	0.01	3.20	-0.0001	-0.0001	-0.0033	-0.0001	-0.0001	-0.0033
0.200	4.01	3.18	-0.0001	0.0004	-0.0026	-0.0001	0.0004	-0.0026
0.200	7.99	3.16	-0.0002	-0.0001	-0.0023	-0.0002	-0.0001	-0.0023
0.199	12.01	3.21	-0.0002	-0.0003	-0.0011	-0.0002	-0.0003	-0.0011
0.199	14.49	3.19	0.0002	-0.0004	-0.0013	0.0002	-0.0004	-0.0013
0.201	12.00	1.00	-0.0001	-0.0001	-0.0087	-0.0001	-0.0001	-0.0087
0.200	14.47	1.00	-0.0003	0.0001	-0.0055	-0.0003	0.0001	-0.0055
0.200	16.00	1.00	-0.0001	0.0000	-0.0089	-0.0001	0.0000	-0.0089
0.201	20.00	1.00	0.0001	0.0003	-0.0092	0.0001	0.0003	-0.0092
0.200	23.99	1.00	0.0000	0.0007	-0.0095	0.0000	0.0007	-0.0095
0.200	26.99	1.00	-0.0001	0.0015	-0.0057	-0.0001	0.0015	-0.0057
0.199	12.00	3.22	-0.0001	-0.0005	0.0000	-0.0001	-0.0005	0.0000
0.199	14.46	3.23	0.0000	-0.0007	-0.0035	0.0000	-0.0007	-0.0035
0.199	16.01	3.25	0.0000	-0.0008	-0.0057	0.0000	-0.0008	-0.0057
0.200	19.99	3.20	0.0001	-0.0007	-0.0057	0.0001	-0.0007	-0.0057
0.199	23.99	3.21	0.0001	-0.0006	-0.0049	0.0001	-0.0006	-0.0049
0.201	26.99	3.21	0.0000	-0.0010	-0.0012	0.0000	-0.0010	-0.0012
0.199	20.01	1.01	-0.0002	0.0001	-0.0013	-0.0002	0.0001	-0.0013
0.200	20.00	2.01	-0.0001	-0.0004	-0.0047	-0.0001	-0.0004	-0.0047
0.200	20.01	2.60	-0.0002	-0.0007	0.0000	-0.0002	-0.0007	0.0000
0.200	20.01	3.18	0.0001	-0.0007	-0.0082	0.0001	-0.0007	-0.0082
0.200	20.01	3.99	0.0000	-0.0009	-0.0046	0.0000	-0.0009	-0.0046

Table 18. Longitudinal Aerodynamic Characteristics for Standard Nozzle With $\theta = 30^\circ$,
 $\delta_{v,p,l} = 10^\circ$, $\delta_{v,p,r} = 10^\circ$, and $\beta = 0^\circ$

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
1.202	-0.01	0.81	-0.0086	0.0193	0.0033	-0.0086	0.0193	0.0033
1.199	0.01	2.00	-0.0070	0.0052	0.0017	-0.0098	0.0182	0.0043
1.199	0.00	3.18	-0.0005	-0.0093	-0.0036	-0.0053	0.0180	0.0009
1.200	-0.03	3.99	0.0040	-0.0180	-0.0081	-0.0025	0.0192	-0.0023
1.200	-0.02	5.55	0.0090	-0.0370	-0.0125	-0.0001	0.0194	-0.0047
1.198	-0.03	7.31	0.0110	-0.0606	-0.0141	-0.0010	0.0178	-0.0041
1.199	-0.02	7.97	0.0126	-0.0695	-0.0148	-0.0005	0.0169	-0.0040
0.902	0.00	0.95	-0.0128	0.0119	0.0056	-0.0128	0.0119	0.0056
0.902	-0.02	1.98	0.0005	-0.0138	-0.0069	-0.0042	0.0089	-0.0025
0.903	-0.01	3.20	0.0059	-0.0391	-0.0113	-0.0027	0.0096	-0.0034
0.903	-0.02	3.99	0.0113	-0.0561	-0.0160	-0.0002	0.0096	-0.0059
0.902	-0.02	4.99	0.0173	-0.0780	-0.0204	0.0028	0.0097	-0.0080
0.902	-0.03	6.00	0.0219	-0.1005	-0.0240	0.0045	0.0093	-0.0093
0.901	-0.03	7.01	0.0269	-0.1231	-0.0273	0.0066	0.0089	-0.0103
0.901	0.01	0.97	-0.0113	0.0117	0.0054	-0.0113	0.0117	0.0054
0.897	4.01	0.98	-0.0090	0.0113	0.0034	-0.0090	0.0113	0.0034
0.901	7.98	1.00	-0.0015	0.0118	-0.0017	-0.0015	0.0118	-0.0017
0.898	10.04	0.99	0.0009	0.0127	-0.0018	0.0009	0.0127	-0.0018
0.901	0.00	6.01	0.0218	-0.1009	-0.0240	0.0043	0.0093	-0.0092
0.901	4.01	5.99	0.0327	-0.0986	-0.0262	0.0076	0.0098	-0.0114
0.899	8.01	5.99	0.0484	-0.0948	-0.0306	0.0157	0.0119	-0.0158
0.900	10.22	5.96	0.0576	-0.0899	-0.0334	0.0211	0.0148	-0.0187
0.803	0.01	0.99	-0.0093	0.0104	0.0031	-0.0093	0.0104	0.0031
0.802	-0.02	2.01	0.0081	-0.0212	-0.0123	0.0020	0.0082	-0.0067
0.802	-0.03	3.21	0.0129	-0.0532	-0.0169	0.0020	0.0087	-0.0069
0.801	-0.02	4.49	0.0234	-0.0888	-0.0245	0.0069	0.0086	-0.0101
0.801	-0.02	5.49	0.0280	-0.1168	-0.0287	0.0079	0.0082	-0.0115
0.603	0.01	1.00	-0.0047	0.0075	0.0001	-0.0047	0.0075	0.0001
0.604	-0.02	2.00	0.0224	-0.0435	-0.0241	0.0118	0.0079	-0.0142
0.600	-0.04	3.20	0.0276	-0.1030	-0.0298	0.0083	0.0072	-0.0119
0.601	-0.01	4.00	0.0364	-0.1411	-0.0358	0.0103	0.0077	-0.0128
0.601	-0.03	4.79	0.0410	-0.1809	-0.0406	0.0097	0.0070	-0.0135
0.601	-0.03	5.48	0.0454	-0.2157	-0.0443	0.0097	0.0058	-0.0138
0.602	0.01	1.01	-0.0045	0.0073	0.0003	-0.0045	0.0073	0.0003
0.602	4.01	1.02	0.0090	0.0076	-0.0102	0.0090	0.0076	-0.0102
0.600	7.97	1.02	0.0136	0.0106	-0.0132	0.0136	0.0106	-0.0132
0.599	12.02	1.02	0.0254	0.0160	-0.0197	0.0254	0.0160	-0.0197
0.599	0.00	4.77	0.0413	-0.1810	-0.0408	0.0098	0.0071	-0.0137
0.600	4.00	4.82	0.0583	-0.1788	-0.0429	0.0136	0.0082	-0.0157
0.600	7.99	4.66	0.0780	-0.1643	-0.0460	0.0224	0.0118	-0.0195
0.600	12.03	4.67	0.1023	-0.1540	-0.0539	0.0343	0.0182	-0.0274

Table 18. Concluded

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
0.198	0.00	1.01	-0.0005	0.0080	-0.0063	-0.0005	0.0080	-0.0063
0.199	-0.02	1.49	0.0541	-0.2444	-0.0586	0.0093	0.0068	-0.0208
0.200	-0.02	2.01	0.1237	-0.4623	-0.1150	0.0249	0.0124	-0.0233
0.200	-0.03	2.61	0.1210	-0.7202	-0.1244	-0.0028	0.0086	-0.0120
0.201	-0.02	3.18	0.1837	-0.9559	-0.1731	0.0121	0.0190	-0.0148
0.201	-0.02	3.95	0.2445	-1.2990	-0.2150	0.0137	0.0131	-0.0109
0.200	0.01	1.01	0.0007	0.0081	-0.0035	0.0007	0.0081	-0.0035
0.200	4.00	1.01	-0.0013	0.0063	-0.0073	-0.0013	0.0063	-0.0073
0.200	7.98	1.00	0.0234	0.0095	-0.0132	0.0234	0.0095	-0.0132
0.201	12.01	1.00	0.0233	0.0159	-0.0199	0.0233	0.0159	-0.0199
0.201	14.49	1.00	0.0330	0.0227	-0.0258	0.0330	0.0227	-0.0258
0.200	-0.01	3.20	0.1866	-0.9752	-0.1734	0.0119	0.0153	-0.0124
0.200	4.01	3.20	0.2517	-0.9565	-0.1752	0.0079	0.0200	-0.0141
0.200	7.98	3.18	0.3447	-0.9218	-0.1803	0.0366	0.0276	-0.0207
0.200	12.01	3.19	0.4089	-0.8964	-0.1881	0.0336	0.0320	-0.0279
0.200	14.50	3.19	0.4673	-0.8702	-0.1968	0.0531	0.0382	-0.0371

Table 19. Aerodynamic Characteristics for Standard Nozzle With $\theta = 30^\circ$,
 $\delta_{v,p,l} = 20^\circ$, $\delta_{v,p,r} = 20^\circ$, and $\beta = 0^\circ$

(a) Longitudinal characteristics

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
1.202	-0.01	0.77	0.0047	0.0184	-0.0063	0.0047	0.0184	-0.0063
1.198	-0.01	2.03	0.0068	0.0043	-0.0088	0.0016	0.0160	-0.0043
1.199	-0.03	3.22	0.0136	-0.0078	-0.0145	0.0041	0.0171	-0.0065
1.199	-0.01	3.98	0.0179	-0.0158	-0.0180	0.0057	0.0177	-0.0077
1.200	-0.03	5.51	0.0264	-0.0325	-0.0251	0.0098	0.0185	-0.0112
1.200	-0.01	6.19	0.0311	-0.0402	-0.0289	0.0125	0.0187	-0.0133
1.200	-0.04	7.31	0.0357	-0.0531	-0.0330	0.0138	0.0188	-0.0148
1.200	-0.04	7.99	0.0380	-0.0615	-0.0349	0.0141	0.0184	-0.0150
0.901	0.01	0.95	-0.0026	0.0110	-0.0011	-0.0026	0.0110	-0.0011
0.904	-0.02	2.01	0.0197	-0.0097	-0.0200	0.0108	0.0107	-0.0123
0.899	-0.01	3.00	0.0202	-0.0299	-0.0208	0.0047	0.0098	-0.0076
0.898	-0.02	3.21	0.0236	-0.0335	-0.0238	0.0068	0.0105	-0.0095
0.900	-0.03	4.00	0.0357	-0.0484	-0.0332	0.0140	0.0113	-0.0149
0.899	-0.03	5.00	0.0451	-0.0686	-0.0414	0.0182	0.0119	-0.0187
0.899	-0.03	6.03	0.0552	-0.0891	-0.0485	0.0229	0.0126	-0.0214
0.899	-0.04	7.02	0.0635	-0.1097	-0.0548	0.0260	0.0124	-0.0236
0.900	0.01	0.95	-0.0026	0.0107	-0.0011	-0.0026	0.0107	-0.0011
0.902	4.01	0.95	0.0022	0.0115	-0.0049	0.0022	0.0115	-0.0049
0.899	7.98	0.95	0.0099	0.0145	-0.0103	0.0099	0.0145	-0.0103
0.899	10.26	0.94	0.0164	0.0172	-0.0140	0.0164	0.0172	-0.0140
0.899	-0.05	6.03	0.0548	-0.0897	-0.0485	0.0225	0.0120	-0.0214
0.899	3.99	5.99	0.0674	-0.0828	-0.0535	0.0282	0.0156	-0.0266
0.903	7.97	6.15	0.0842	-0.0770	-0.0611	0.0374	0.0208	-0.0338
0.900	10.43	6.05	0.0953	-0.0691	-0.0655	0.0450	0.0253	-0.0384
0.799	0.01	0.96	-0.0006	0.0101	-0.0028	-0.0006	0.0101	-0.0028
0.799	-0.03	2.01	0.0291	-0.0149	-0.0279	0.0176	0.0112	-0.0180
0.801	-0.01	3.20	0.0317	-0.0449	-0.0309	0.0105	0.0102	-0.0130
0.802	-0.02	4.50	0.0516	-0.0763	-0.0465	0.0209	0.0120	-0.0207
0.802	-0.04	5.51	0.0627	-0.1021	-0.0550	0.0255	0.0124	-0.0238
0.601	-0.02	0.99	0.0104	0.0100	-0.0123	0.0104	0.0100	-0.0123
0.603	-0.03	1.99	0.0546	-0.0329	-0.0488	0.0349	0.0121	-0.0318
0.602	-0.03	3.21	0.0598	-0.0878	-0.0537	0.0220	0.0106	-0.0218
0.602	-0.03	4.00	0.0786	-0.1227	-0.0686	0.0301	0.0109	-0.0275
0.602	-0.03	4.77	0.0890	-0.1569	-0.0777	0.0316	0.0118	-0.0294
0.601	-0.03	5.50	0.1010	-0.1918	-0.0856	0.0349	0.0111	-0.0302
0.602	0.01	0.99	0.0002	0.0083	-0.0042	0.0002	0.0083	-0.0042
0.601	4.00	0.99	0.0142	0.0112	-0.0149	0.0142	0.0112	-0.0149
0.601	7.98	0.99	0.0332	0.0183	-0.0284	0.0332	0.0183	-0.0284
0.601	10.60	0.99	0.0392	0.0229	-0.0334	0.0392	0.0229	-0.0334
0.602	-0.03	4.82	0.0914	-0.1596	-0.0780	0.0334	0.0115	-0.0292
0.599	3.99	4.81	0.1084	-0.1527	-0.0819	0.0380	0.0152	-0.0327
0.599	7.99	4.81	0.1301	-0.1413	-0.0881	0.0481	0.0212	-0.0389
0.599	10.52	4.81	0.1430	-0.1326	-0.0935	0.0540	0.0260	-0.0443
0.604	16.01	0.99	0.0587	0.0331	-0.0439	0.0587	0.0331	-0.0439
0.602	19.97	0.99	0.0693	0.0431	-0.0530	0.0693	0.0431	-0.0530
0.599	19.99	0.98	0.0687	0.0430	-0.0532	0.0687	0.0430	-0.0532
0.601	19.95	2.03	0.1210	0.0153	-0.0881	0.0848	0.0518	-0.0698
0.600	19.95	3.21	0.1482	-0.0339	-0.0960	0.0785	0.0439	-0.0625
0.598	19.95	4.80	0.1987	-0.0925	-0.1200	0.0843	0.0508	-0.0701
0.598	19.93	5.50	0.2208	-0.1212	-0.1279	0.0865	0.0502	-0.0710

Table 19. Continued

(a) Concluded

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
0.201	0.01	0.99	-0.0026	0.0060	-0.0122	-0.0026	0.0060	-0.0122
0.202	-0.02	1.49	0.0975	-0.2100	-0.1044	0.0147	0.0011	-0.0318
0.202	-0.02	2.00	0.1922	-0.3882	-0.1883	0.0161	0.0132	-0.0369
0.202	-0.02	2.59	0.2871	-0.6095	-0.2594	0.0313	0.0133	-0.0417
0.202	-0.02	3.20	0.3414	-0.8534	-0.3057	0.0086	0.0136	-0.0238
0.203	-0.01	3.98	0.4443	-1.1570	-0.3855	0.0179	0.0127	-0.0250
0.202	0.02	1.00	-0.0013	0.0057	-0.0100	-0.0013	0.0057	-0.0100
0.202	4.00	1.00	0.0276	0.0062	-0.0233	0.0276	0.0062	-0.0233
0.202	8.02	1.00	0.0282	0.0165	-0.0270	0.0282	0.0165	-0.0270
0.202	12.00	1.00	0.0507	0.0231	-0.0379	0.0507	0.0231	-0.0379
0.202	14.50	1.00	0.0479	0.0321	-0.0435	0.0479	0.0321	-0.0435
0.201	-0.01	3.19	0.3532	-0.8533	-0.3062	0.0193	0.0150	-0.0234
0.201	4.01	3.20	0.4101	-0.8300	-0.3097	0.0156	0.0143	-0.0266
0.201	8.01	3.20	0.4916	-0.7916	-0.3168	0.0381	0.0250	-0.0331
0.201	12.00	3.20	0.5475	-0.7533	-0.3267	0.0381	0.0299	-0.0429
0.201	14.54	3.20	0.5796	-0.7204	-0.3331	0.0375	0.0376	-0.0501
0.199	12.02	1.00	0.0362	0.0231	-0.0330	0.0362	0.0231	-0.0330
0.199	14.48	1.00	0.0559	0.0263	-0.0377	0.0559	0.0263	-0.0377
0.200	16.01	1.00	0.0587	0.0235	-0.0416	0.0587	0.0235	-0.0416
0.199	20.01	1.00	0.0725	0.0362	-0.0547	0.0725	0.0362	-0.0547
0.199	24.02	1.00	0.0931	0.0492	-0.0636	0.0931	0.0492	-0.0636
0.200	26.98	1.00	0.0947	0.0523	-0.0674	0.0947	0.0523	-0.0674
0.200	11.97	3.18	0.5620	-0.7610	-0.3279	0.0417	0.0128	-0.0287
0.198	14.49	3.20	0.6123	-0.7538	-0.3418	0.0472	0.0120	-0.0368
0.201	16.01	3.20	0.6152	-0.7187	-0.3387	0.0441	0.0139	-0.0411
0.200	20.01	3.20	0.6908	-0.6665	-0.3522	0.0664	0.0286	-0.0529
0.200	24.00	3.21	0.7591	-0.6094	-0.3635	0.0844	0.0440	-0.0627
0.200	26.98	3.21	0.7915	-0.5743	-0.3712	0.0837	0.0431	-0.0704
0.198	20.02	1.00	0.0808	0.0413	-0.0521	0.0808	0.0413	-0.0521
0.199	19.96	1.98	0.4051	-0.2553	-0.2394	0.0897	0.0639	-0.0801
0.200	19.96	2.57	0.5703	-0.4353	-0.3087	0.1049	0.0647	-0.0758
0.200	19.96	3.18	0.6858	-0.6568	-0.3480	0.0686	0.0307	-0.0515
0.201	19.98	4.03	0.8969	-0.9426	-0.4379	0.0781	0.0537	-0.0636

Table 19. Continued

(b) Lateral characteristics

MACH	ALPHA	NPR	CR	CN	CY	CRA	CNA	CYA
1.202	-0.01	0.77	0.0001	0.0001	0.0024	0.0001	0.0001	0.0024
1.198	-0.01	2.03	0.0001	0.0000	0.0024	0.0001	0.0000	0.0024
1.199	-0.03	3.22	0.0001	0.0000	0.0028	0.0001	0.0000	0.0028
1.199	-0.01	3.98	0.0001	0.0000	0.0033	0.0001	0.0000	0.0033
1.200	-0.03	5.51	0.0001	0.0000	0.0035	0.0001	0.0000	0.0035
1.200	-0.01	6.19	0.0001	-0.0001	0.0048	0.0001	-0.0001	0.0048
1.200	-0.04	7.31	0.0001	0.0000	0.0045	0.0001	0.0000	0.0045
1.200	-0.04	7.99	0.0002	0.0000	0.0046	0.0002	0.0000	0.0046
0.901	0.01	0.95	0.0001	0.0002	0.0012	0.0001	0.0002	0.0012
0.904	-0.02	2.01	0.0002	0.0002	0.0018	0.0002	0.0002	0.0018
0.899	-0.01	3.00	0.0002	0.0000	0.0028	0.0002	0.0000	0.0028
0.898	-0.02	3.21	0.0002	0.0001	0.0026	0.0002	0.0001	0.0026
0.900	-0.03	4.00	0.0002	0.0001	0.0029	0.0002	0.0001	0.0029
0.899	-0.03	5.00	0.0003	0.0002	0.0035	0.0003	0.0002	0.0035
0.899	-0.03	6.03	0.0003	0.0002	0.0039	0.0003	0.0002	0.0039
0.899	-0.04	7.02	0.0003	0.0002	0.0039	0.0003	0.0002	0.0039
0.900	0.01	0.95	0.0001	0.0002	0.0011	0.0001	0.0002	0.0011
0.902	4.01	0.95	0.0002	0.0003	0.0000	0.0002	0.0003	0.0000
0.899	7.98	0.95	0.0002	0.0005	-0.0004	0.0002	0.0005	-0.0004
0.899	10.26	0.94	0.0002	0.0005	-0.0003	0.0002	0.0005	-0.0003
0.899	-0.05	6.03	0.0003	0.0002	0.0037	0.0003	0.0002	0.0037
0.899	3.99	5.99	0.0003	0.0004	0.0030	0.0003	0.0004	0.0030
0.903	7.97	6.15	0.0003	0.0005	0.0025	0.0003	0.0005	0.0025
0.900	10.43	6.05	0.0003	0.0005	0.0034	0.0003	0.0005	0.0034
0.799	0.01	0.96	0.0002	0.0003	-0.0004	0.0002	0.0003	-0.0004
0.799	-0.03	2.01	0.0003	0.0003	0.0011	0.0003	0.0003	0.0011
0.801	-0.01	3.20	0.0002	0.0001	0.0013	0.0002	0.0001	0.0013
0.802	-0.02	4.50	0.0003	0.0003	0.0028	0.0003	0.0003	0.0028
0.802	-0.04	5.51	0.0004	0.0004	0.0027	0.0004	0.0004	0.0027
0.601	-0.02	0.99	0.0008	0.0022	-0.0050	0.0008	0.0022	-0.0050
0.603	-0.03	1.99	0.0004	0.0004	0.0003	0.0004	0.0004	0.0003
0.602	-0.03	3.21	0.0004	0.0007	-0.0005	0.0004	0.0007	-0.0005
0.602	-0.03	4.00	0.0005	0.0006	0.0014	0.0005	0.0006	0.0014
0.602	-0.03	4.77	0.0004	0.0004	0.0021	0.0004	0.0004	0.0021
0.601	-0.03	5.50	0.0005	0.0004	0.0030	0.0005	0.0004	0.0030
0.602	0.01	0.99	0.0001	0.0005	-0.0009	0.0001	0.0005	-0.0009
0.601	4.00	0.99	0.0007	0.0024	-0.0073	0.0007	0.0024	-0.0073
0.601	7.98	0.99	0.0002	0.0006	-0.0011	0.0002	0.0006	-0.0011
0.601	10.60	0.99	0.0002	0.0004	-0.0007	0.0002	0.0004	-0.0007
0.602	-0.03	4.82	0.0005	0.0004	0.0015	0.0005	0.0004	0.0026
0.599	3.99	4.81	0.0004	0.0004	0.0026	0.0004	0.0004	0.0026
0.599	7.99	4.81	0.0004	0.0005	0.0021	0.0004	0.0005	0.0021
0.599	10.52	4.81	0.0003	0.0004	0.0039	0.0003	0.0004	0.0039
0.604	16.01	0.99	0.0000	0.0004	-0.0003	0.0000	0.0004	-0.0003
0.602	19.97	0.99	0.0002	0.0011	-0.0030	0.0002	0.0011	-0.0030
0.599	19.99	0.98	0.0002	0.0012	-0.0032	0.0002	0.0012	-0.0032
0.601	19.95	2.03	0.0002	0.0007	0.0009	0.0002	0.0007	0.0009
0.600	19.95	3.21	0.0002	0.0010	0.0006	0.0002	0.0010	0.0006
0.598	19.95	4.80	0.0003	0.0009	0.0027	0.0003	0.0009	0.0027
0.598	19.93	5.50	0.0003	0.0008	0.0031	0.0003	0.0008	0.0031

Table 19. Concluded

(b) Concluded

MACH	ALPHA	NPR	CR	CN	CY	CRA	CNA	CYA
0.201	0.01	0.99	0.0004	0.0027	-0.0070	0.0004	0.0027	-0.0070
0.202	-0.02	1.49	0.0006	-0.0003	-0.0043	0.0006	-0.0003	-0.0043
0.202	-0.02	2.00	0.0008	-0.0012	-0.0049	0.0008	-0.0012	-0.0049
0.202	-0.02	2.59	0.0010	-0.0011	-0.0042	0.0010	-0.0011	-0.0042
0.202	-0.02	3.20	0.0010	-0.0004	0.0051	0.0010	-0.0004	0.0051
0.203	-0.01	3.98	0.0011	-0.0002	0.0123	0.0011	-0.0002	0.0123
0.202	0.02	1.00	0.0006	0.0025	-0.0124	0.0006	0.0025	-0.0124
0.202	4.00	1.00	0.0004	0.0008	-0.0081	0.0004	0.0008	-0.0081
0.202	8.02	1.00	0.0003	0.0006	-0.0047	0.0003	0.0006	-0.0047
0.202	12.00	1.00	0.0003	0.0007	-0.0050	0.0003	0.0007	-0.0050
0.202	14.50	1.00	0.0003	0.0008	-0.0049	0.0003	0.0008	-0.0049
0.201	-0.01	3.19	0.0012	-0.0004	-0.0049	0.0012	-0.0004	-0.0049
0.201	4.01	3.20	0.0012	-0.0005	-0.0058	0.0012	-0.0005	-0.0058
0.201	8.01	3.20	0.0009	-0.0006	0.0061	0.0009	-0.0006	0.0061
0.201	12.00	3.20	0.0008	-0.0006	0.0117	0.0008	-0.0006	0.0117
0.201	14.54	3.20	0.0007	-0.0007	0.0118	0.0007	-0.0007	0.0118
0.199	12.02	1.00	-0.0004	0.0006	-0.0001	-0.0004	0.0006	-0.0001
0.199	14.48	1.00	-0.0005	0.0006	-0.0003	-0.0005	0.0006	-0.0003
0.200	16.01	1.00	-0.0005	0.0005	-0.0002	-0.0005	0.0005	-0.0002
0.199	20.01	1.00	-0.0005	0.0006	0.0009	-0.0005	0.0006	0.0009
0.199	24.02	1.00	-0.0003	0.0009	-0.0008	-0.0003	0.0009	-0.0008
0.200	26.98	1.00	-0.0003	0.0022	-0.0049	-0.0003	0.0022	-0.0049
0.200	11.97	3.18	0.0002	-0.0005	0.0088	0.0002	-0.0005	0.0088
0.198	14.49	3.20	0.0003	-0.0007	0.0079	0.0003	-0.0007	0.0079
0.201	16.01	3.20	0.0000	-0.0007	0.0180	0.0000	-0.0007	0.0180
0.200	20.01	3.20	0.0003	-0.0004	0.0109	0.0003	-0.0004	0.0109
0.200	24.00	3.21	0.0003	0.0001	0.0059	0.0003	0.0001	0.0059
0.200	26.98	3.21	0.0001	0.0000	0.0129	0.0001	0.0000	0.0129
0.198	20.02	1.00	-0.0006	-0.0001	0.0000	-0.0006	-0.0001	0.0000
0.199	19.96	1.98	-0.0001	-0.0014	0.0015	-0.0001	-0.0014	0.0015
0.200	19.96	2.57	0.0001	-0.0016	0.0048	0.0001	-0.0016	0.0048
0.200	19.96	3.18	0.0002	-0.0004	0.0097	0.0002	-0.0004	0.0097
0.201	19.98	4.03	0.0002	-0.0002	0.0208	0.0002	-0.0002	0.0208

Table 20. Longitudinal Aerodynamic Characteristics for Standard Nozzle With $\theta = 30^\circ$,
 $\delta_{v,p,l} = 30^\circ$, $\delta_{v,p,r} = 30^\circ$, and $\beta = 0^\circ$

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
0.898	-0.02	0.91	0.0141	0.0140	-0.0155	0.0141	0.0140	-0.0155
0.900	-0.01	2.02	0.0405	-0.0004	-0.0373	0.0296	0.0161	-0.0273
0.896	-0.04	3.17	0.0582	-0.0164	-0.0525	0.0361	0.0186	-0.0328
0.899	-0.04	4.02	0.0663	-0.0313	-0.0586	0.0348	0.0166	-0.0307
0.900	-0.05	4.99	0.0766	-0.0478	-0.0686	0.0390	0.0182	-0.0357
0.899	-0.05	5.98	0.0881	-0.0647	-0.0778	0.0441	0.0200	-0.0396
0.899	-0.04	7.00	0.0986	-0.0837	-0.0869	0.0481	0.0204	-0.0432
0.897	0.01	0.92	0.0149	0.0150	-0.0162	0.0149	0.0150	-0.0162
0.901	4.01	0.91	0.0221	0.0191	-0.0216	0.0221	0.0191	-0.0216
0.898	7.97	0.89	0.0327	0.0258	-0.0299	0.0327	0.0258	-0.0299
0.900	12.00	0.87	0.0445	0.0334	-0.0375	0.0445	0.0334	-0.0375
0.898	-0.05	6.01	0.0894	-0.0658	-0.0785	0.0451	0.0198	-0.0400
0.900	3.95	6.03	0.1024	-0.0556	-0.0856	0.0524	0.0266	-0.0472
0.903	7.98	6.05	0.1174	-0.0434	-0.0934	0.0619	0.0349	-0.0551
0.895	10.73	6.00	0.1304	-0.0340	-0.1003	0.0706	0.0422	-0.0615
0.799	0.01	0.93	0.0162	0.0143	-0.0163	0.0162	0.0143	-0.0163
0.800	1.09	2.02	0.0593	0.0021	-0.0523	0.0452	0.0224	-0.0398
0.799	0.92	3.23	0.0865	-0.0179	-0.0750	0.0569	0.0269	-0.0494
0.800	0.89	4.48	0.0907	-0.0503	-0.0794	0.0460	0.0204	-0.0410
0.799	0.81	5.48	0.1033	-0.0731	-0.0888	0.0501	0.0216	-0.0436
0.603	0.06	0.96	0.0184	0.0139	-0.0170	0.0184	0.0139	-0.0170
0.600	-0.26	2.02	0.0828	-0.0123	-0.0732	0.0587	0.0244	-0.0510
0.600	-0.42	3.23	0.1170	-0.0536	-0.1030	0.0665	0.0271	-0.0575
0.601	-0.46	3.97	0.1258	-0.0848	-0.1107	0.0567	0.0212	-0.0489
0.601	-0.50	4.77	0.1342	-0.1196	-0.1179	0.0540	0.0199	-0.0465
0.600	-0.54	5.50	0.1444	-0.1516	-0.1268	0.0537	0.0196	-0.0464
0.600	0.04	0.98	0.0146	0.0137	-0.0165	0.0146	0.0137	-0.0165
0.600	3.99	0.97	0.0332	0.0216	-0.0313	0.0332	0.0216	-0.0313
0.600	7.97	0.97	0.0496	0.0313	-0.0441	0.0496	0.0313	-0.0441
0.600	12.07	0.96	0.0524	0.0367	-0.0450	0.0524	0.0367	-0.0450
0.600	0.86	4.81	0.1381	-0.1166	-0.1200	0.0540	0.0226	-0.0481
0.601	4.01	4.82	0.1528	-0.1066	-0.1244	0.0613	0.0278	-0.0526
0.595	7.97	4.80	0.1719	-0.0935	-0.1332	0.0697	0.0360	-0.0602
0.600	11.60	4.81	0.1920	-0.0748	-0.1410	0.0829	0.0470	-0.0688

Table 20. Concluded

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
0.199	-0.01	0.99	0.0223	0.0135	-0.0232	0.0223	0.0135	-0.0232
0.200	-0.09	1.53	0.1444	-0.1620	-0.1497	0.0319	0.0203	-0.0440
0.200	-0.15	2.01	0.2640	-0.2895	-0.2528	0.0474	0.0388	-0.0545
0.200	-0.23	2.61	0.4013	-0.4847	-0.3605	0.0565	0.0247	-0.0475
0.200	-0.28	3.18	0.5029	-0.6686	-0.4538	0.0618	0.0390	-0.0564
0.201	-0.40	3.98	0.6750	-0.9198	-0.6007	0.0556	0.0290	-0.0474
0.200	-0.03	1.00	0.0222	0.0133	-0.0232	0.0222	0.0133	-0.0232
0.200	3.97	1.00	0.0302	0.0227	-0.0347	0.0302	0.0227	-0.0347
0.200	7.96	1.00	0.0506	0.0276	-0.0435	0.0506	0.0276	-0.0435
0.201	12.05	1.00	0.0678	0.0439	-0.0509	0.0678	0.0439	-0.0509
0.201	14.50	1.00	0.0700	0.0466	-0.0562	0.0700	0.0466	-0.0562
0.201	0.00	3.19	0.5039	-0.6623	-0.4525	0.0597	0.0410	-0.0558
0.201	3.99	3.20	0.5640	-0.6228	-0.4580	0.0713	0.0483	-0.0609
0.201	8.00	3.19	0.6189	-0.5706	-0.4645	0.0811	0.0638	-0.0679
0.201	12.02	3.19	0.6799	-0.5143	-0.4782	0.0975	0.0824	-0.0805
0.201	14.47	3.20	0.7065	-0.4806	-0.4885	0.0973	0.0922	-0.0897

Table 21. Longitudinal Aerodynamic Characteristics for Standard Nozzle With $\theta = 30^\circ$,
 $\delta_{v,p,l} = -20^\circ$, $\delta_{v,p,r} = -20^\circ$, and $\beta = 0^\circ$

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
1.200	0.04	0.76	-0.0219	0.0243	0.0160	-0.0219	0.0243	0.0160
1.197	0.03	2.01	-0.0221	0.0080	0.0148	-0.0172	0.0192	0.0104
1.200	0.05	3.20	-0.0324	-0.0029	0.0242	-0.0227	0.0212	0.0158
1.200	0.14	4.01	-0.0393	-0.0099	0.0300	-0.0268	0.0236	0.0191
1.200	0.07	5.51	-0.0459	-0.0276	0.0356	-0.0283	0.0232	0.0207
1.200	0.07	7.30	-0.0515	-0.0501	0.0398	-0.0279	0.0213	0.0202
1.199	0.05	8.00	-0.0524	-0.0592	0.0409	-0.0264	0.0204	0.0194
0.898	0.03	0.98	-0.0061	0.0116	0.0000	-0.0061	0.0116	0.0000
0.900	0.10	2.00	-0.0308	-0.0066	0.0211	-0.0222	0.0130	0.0133
0.899	0.04	3.18	-0.0322	-0.0307	0.0229	-0.0150	0.0119	0.0080
0.901	0.06	4.02	-0.0432	-0.0464	0.0314	-0.0208	0.0131	0.0121
0.901	0.05	5.01	-0.0510	-0.0664	0.0386	-0.0228	0.0133	0.0146
0.899	0.05	6.00	-0.0606	-0.0865	0.0453	-0.0264	0.0140	0.0165
0.901	0.08	7.01	-0.0683	-0.1072	0.0517	-0.0283	0.0137	0.0182
0.900	0.01	0.98	-0.0063	0.0111	-0.0001	-0.0063	0.0111	-0.0001
0.899	4.01	0.98	-0.0023	0.0118	-0.0028	-0.0023	0.0118	-0.0028
0.899	8.03	0.97	0.0029	0.0137	-0.0049	0.0029	0.0137	-0.0049
0.896	11.10	0.96	0.0110	0.0162	-0.0095	0.0110	0.0162	-0.0095
0.897	0.07	6.00	-0.0609	-0.0876	0.0456	-0.0266	0.0133	0.0167
0.900	4.04	6.03	-0.0475	-0.0910	0.0414	-0.0203	0.0120	0.0126
0.900	8.06	6.00	-0.0320	-0.0922	0.0370	-0.0121	0.0120	0.0083
0.900	11.23	6.04	-0.0157	-0.0927	0.0310	-0.0015	0.0131	0.0021
0.803	0.01	0.97	-0.0126	0.0118	0.0050	-0.0126	0.0118	0.0050
0.801	0.02	2.00	-0.0426	-0.0106	0.0314	-0.0317	0.0142	0.0216
0.802	0.04	3.21	-0.0441	-0.0416	0.0331	-0.0222	0.0126	0.0142
0.803	0.06	4.51	-0.0616	-0.0742	0.0466	-0.0298	0.0134	0.0193
0.803	0.06	5.51	-0.0723	-0.0997	0.0543	-0.0330	0.0135	0.0211
0.598	0.03	1.00	-0.0252	0.0115	0.0159	-0.0252	0.0115	0.0159
0.599	0.06	2.02	-0.0690	-0.0297	0.0507	-0.0493	0.0151	0.0330
0.600	0.04	3.20	-0.0762	-0.0847	0.0576	-0.0373	0.0118	0.0240
0.601	0.06	4.00	-0.0922	-0.1201	0.0707	-0.0421	0.0129	0.0273
0.602	0.05	4.80	-0.1034	-0.1561	0.0798	-0.0429	0.0131	0.0282
0.602	0.07	5.48	-0.1138	-0.1876	0.0874	-0.0444	0.0129	0.0286
0.601	0.03	1.00	-0.0283	0.0115	0.0176	-0.0283	0.0115	0.0176
0.602	4.03	1.01	-0.0213	0.0098	0.0132	-0.0213	0.0098	0.0132
0.603	8.03	1.01	-0.0169	0.0096	0.0100	-0.0169	0.0096	0.0100
0.601	10.68	1.00	-0.0104	0.0101	0.0068	-0.0104	0.0101	0.0068
0.601	0.05	4.78	-0.1035	-0.1559	0.0801	-0.0431	0.0129	0.0286
0.601	4.06	4.82	-0.0875	-0.1646	0.0772	-0.0388	0.0096	0.0253
0.601	8.03	4.78	-0.0674	-0.1671	0.0719	-0.0309	0.0087	0.0203
0.600	11.24	4.81	-0.0481	-0.1721	0.0673	-0.0214	0.0071	0.0154

Table 21. Concluded

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
0.203	0.02	1.00	-0.0373	0.0124	0.0187	-0.0373	0.0124	0.0187
0.201	0.02	1.50	-0.1348	-0.2001	0.1057	-0.0475	0.0134	0.0253
0.201	0.04	1.99	-0.2462	-0.3690	0.1940	-0.0766	0.0164	0.0414
0.202	0.04	2.62	-0.3323	-0.6112	0.2761	-0.0653	0.0185	0.0454
0.203	0.04	3.19	-0.3769	-0.8359	0.3199	-0.0361	0.0084	0.0253
0.203	0.07	4.02	-0.4930	-1.1580	0.4122	-0.0524	0.0151	0.0307
0.202	0.00	1.00	-0.0383	0.0118	0.0219	-0.0383	0.0118	0.0219
0.202	4.03	1.00	-0.0377	0.0069	0.0212	-0.0377	0.0069	0.0212
0.203	8.02	1.00	-0.0248	0.0048	0.0184	-0.0248	0.0048	0.0184
0.202	12.03	1.00	-0.0145	0.0075	0.0092	-0.0145	0.0075	0.0092
0.203	14.52	1.00	-0.0165	0.0103	0.0078	-0.0165	0.0103	0.0078
0.200	0.05	3.20	-0.3868	-0.8641	0.3289	-0.0363	0.0050	0.0258
0.200	4.02	3.20	-0.3247	-0.8841	0.3271	-0.0354	0.0066	0.0242
0.200	8.07	3.20	-0.2396	-0.8995	0.3203	-0.0147	0.0056	0.0186
0.200	12.04	3.18	-0.1739	-0.9064	0.3093	-0.0126	0.0085	0.0085
0.199	14.52	3.21	-0.1334	-0.9384	0.3110	-0.0104	-0.0019	0.0056

Table 22. Aerodynamic Characteristics for Standard Nozzle With $\theta = 30^\circ$,
 $\delta_{v,p,l} = -20^\circ$, $\delta_{v,p,r} = 20^\circ$, and $\beta = 0^\circ$

(a) Longitudinal characteristics

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
1.200	0.02	0.78	-0.0115	0.0213	0.0071	-0.0115	0.0213	0.0071
1.199	0.01	2.03	-0.0092	0.0051	0.0042	-0.0092	0.0168	0.0042
1.200	0.12	3.03	-0.0113	-0.0038	0.0066	-0.0114	0.0188	0.0066
1.199	0.04	3.23	-0.0117	-0.0060	0.0069	-0.0117	0.0188	0.0069
1.198	0.03	4.00	-0.0109	-0.0143	0.0068	-0.0109	0.0198	0.0068
1.197	0.03	5.48	-0.0080	-0.0301	0.0040	-0.0080	0.0213	0.0040
1.198	0.05	6.20	-0.0067	-0.0392	0.0036	-0.0068	0.0206	0.0036
1.199	0.05	7.29	-0.0070	-0.0531	0.0032	-0.0070	0.0193	0.0032
1.200	0.04	8.04	-0.0070	-0.0628	0.0030	-0.0071	0.0183	0.0030
0.902	0.02	0.96	-0.0073	0.0113	0.0013	-0.0073	0.0113	0.0013
0.897	0.01	2.00	-0.0087	-0.0094	0.0025	-0.0087	0.0111	0.0025
0.898	0.02	3.19	-0.0064	-0.0327	0.0010	-0.0064	0.0107	0.0010
0.900	0.04	4.00	-0.0049	-0.0487	0.0009	-0.0049	0.0116	0.0009
0.900	0.04	5.03	-0.0053	-0.0699	0.0012	-0.0054	0.0117	0.0012
0.901	0.03	6.03	-0.0058	-0.0903	0.0011	-0.0059	0.0121	0.0011
0.899	0.05	6.99	-0.0040	-0.1113	0.0007	-0.0041	0.0114	0.0007
0.901	0.01	0.96	-0.0067	0.0113	0.0012	-0.0067	0.0113	0.0012
0.902	4.01	0.96	-0.0009	0.0119	-0.0027	-0.0009	0.0119	-0.0027
0.901	8.01	0.95	0.0043	0.0138	-0.0063	0.0043	0.0138	-0.0063
0.900	12.01	0.94	0.0158	0.0181	-0.0126	0.0158	0.0181	-0.0126
0.900	0.04	6.06	-0.0058	-0.0916	0.0010	-0.0059	0.0115	0.0010
0.900	4.05	6.07	0.0072	-0.0909	-0.0027	-0.0001	0.0122	-0.0027
0.899	8.02	6.03	0.0229	-0.0873	-0.0080	0.0086	0.0145	-0.0080
0.904	11.99	6.06	0.0428	-0.0808	-0.0154	0.0216	0.0193	-0.0154
0.804	0.01	0.96	-0.0071	0.0106	0.0020	-0.0071	0.0106	0.0020
0.802	0.04	2.02	-0.0107	-0.0146	0.0046	-0.0108	0.0114	0.0046
0.803	0.06	3.22	-0.0063	-0.0455	0.0018	-0.0063	0.0097	0.0018
0.800	0.17	4.54	-0.0062	-0.0791	0.0021	-0.0065	0.0112	0.0021
0.802	0.08	5.52	-0.0052	-0.1046	0.0017	-0.0053	0.0112	0.0017
0.599	0.00	1.00	-0.0192	0.0103	0.0130	-0.0192	0.0103	0.0130
0.602	0.01	2.00	-0.0040	-0.0339	0.0005	-0.0040	0.0116	0.0005
0.600	0.02	3.22	-0.0093	-0.0897	0.0050	-0.0093	0.0089	0.0050
0.600	0.03	4.00	-0.0065	-0.1250	0.0034	-0.0066	0.0110	0.0034
0.600	0.03	5.00	-0.0059	-0.1722	0.0013	-0.0060	0.0105	0.0013
0.600	0.02	4.83	-0.0060	-0.1640	0.0011	-0.0060	0.0107	0.0011
0.600	0.02	5.49	-0.0037	-0.1950	0.0010	-0.0037	0.0106	0.0010
0.600	0.00	1.00	-0.0194	0.0106	0.0128	-0.0194	0.0106	0.0128
0.600	4.02	1.00	-0.0156	0.0091	0.0104	-0.0156	0.0091	0.0104
0.599	8.00	1.00	-0.0079	0.0100	0.0064	-0.0079	0.0100	0.0064
0.599	12.00	1.00	0.0003	0.0118	0.0007	0.0003	0.0118	0.0007
0.599	0.05	4.85	-0.0039	-0.1654	0.0011	-0.0041	0.0109	0.0011
0.600	4.03	4.81	0.0139	-0.1621	-0.0018	0.0017	0.0110	-0.0018
0.600	8.05	4.80	0.0330	-0.1589	-0.0059	0.0087	0.0127	-0.0059
0.600	12.03	4.82	0.0543	-0.1536	-0.0127	0.0181	0.0165	-0.0127
0.598	20.02	1.00	0.0230	0.0154	-0.0107	0.0230	0.0154	-0.0107
0.597	20.13	1.98	0.0595	-0.0157	-0.0286	0.0440	0.0264	-0.0286
0.598	20.05	3.22	0.0735	-0.0701	-0.0258	0.0395	0.0231	-0.0258
0.598	20.04	4.79	0.1033	-0.1384	-0.0294	0.0435	0.0257	-0.0294
0.598	20.08	5.49	0.1164	-0.1690	-0.0302	0.0451	0.0261	-0.0302

Table 22. Continued

(a) Concluded

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
0.201	0.00	1.00	-0.0316	0.0094	0.0111	-0.0316	0.0094	0.0111
0.201	-0.01	1.51	-0.0166	-0.2139	-0.0010	-0.0166	0.0069	-0.0010
0.201	0.02	2.01	-0.0221	-0.3879	-0.0009	-0.0222	0.0187	-0.0009
0.202	0.02	2.61	-0.0061	-0.6158	-0.0034	-0.0063	0.0247	-0.0034
0.200	0.00	3.20	-0.0064	-0.8682	0.0012	-0.0064	0.0086	0.0012
0.201	0.02	4.00	-0.0108	-1.1910	0.0016	-0.0112	0.0192	0.0016
0.202	-0.01	1.00	-0.0301	0.0077	0.0133	-0.0301	0.0077	0.0133
0.202	4.02	1.00	-0.0034	0.0024	0.0029	-0.0034	0.0024	0.0029
0.202	8.00	1.00	-0.0048	0.0071	-0.0037	-0.0048	0.0071	-0.0037
0.201	12.00	1.00	-0.0004	0.0074	-0.0096	-0.0004	0.0074	-0.0096
0.201	14.53	1.00	0.0144	0.0147	-0.0154	0.0144	0.0147	-0.0154
0.202	0.03	3.26	-0.0070	-0.8873	0.0026	-0.0074	0.0017	0.0026
0.202	4.02	3.23	0.0556	-0.8684	0.0004	-0.0057	0.0045	0.0004
0.202	8.02	3.23	0.1405	-0.8605	-0.0057	0.0183	0.0059	-0.0057
0.201	12.02	3.22	0.2013	-0.8461	-0.0122	0.0183	0.0131	-0.0122
0.202	14.52	3.22	0.2460	-0.8306	-0.0187	0.0267	0.0160	-0.0187
0.200	12.49	1.01	0.0197	0.0060	-0.0075	0.0197	0.0060	-0.0075
0.201	20.01	1.01	0.0402	0.0146	-0.0237	0.0402	0.0146	-0.0237
0.200	11.98	1.00	0.0180	0.0165	-0.0081	0.0180	0.0165	-0.0081
0.201	14.52	1.00	0.0159	0.0143	-0.0125	0.0159	0.0143	-0.0125
0.201	16.00	1.00	0.0276	0.0133	-0.0139	0.0276	0.0133	-0.0139
0.201	20.02	1.00	0.0407	0.0200	-0.0258	0.0407	0.0200	-0.0258
0.201	24.01	1.00	0.0610	0.0281	-0.0332	0.0610	0.0281	-0.0332
0.201	26.99	1.00	0.0794	0.0370	-0.0379	0.0794	0.0370	-0.0379
0.200	12.01	3.20	0.1993	-0.8491	-0.0085	0.0170	0.0078	-0.0085
0.201	14.51	3.21	0.2557	-0.8357	-0.0120	0.0358	0.0142	-0.0120
0.200	16.03	3.21	0.2847	-0.8346	-0.0167	0.0397	0.0179	-0.0167
0.199	20.00	3.21	0.3698	-0.8122	-0.0277	0.0644	0.0273	-0.0277
0.200	24.01	3.21	0.4174	-0.7791	-0.0386	0.0571	0.0297	-0.0386
0.200	27.02	3.21	0.4845	-0.7492	-0.0465	0.0822	0.0395	-0.0465
0.199	20.01	1.01	0.0407	0.0175	-0.0259	0.0407	0.0175	-0.0259
0.199	20.02	2.00	0.2070	-0.3540	-0.0354	0.0671	0.0301	-0.0354
0.199	20.01	2.58	0.2919	-0.5715	-0.0364	0.0700	0.0378	-0.0364
0.199	20.02	3.19	0.3677	-0.8065	-0.0263	0.0654	0.0232	-0.0263
0.199	20.07	3.99	0.4740	-1.1190	-0.0301	0.0536	0.0320	-0.0301

Table 22. Continued

(b) Lateral characteristics

MACH	ALPHA	NPR	CR	CN	CY	CRA	CNA	CYA
1.200	0.02	0.78	-0.0006	-0.0014	0.0056	-0.0006	-0.0014	0.0056
1.199	0.01	2.03	-0.0007	-0.0016	0.0064	-0.0004	-0.0005	0.0030
1.200	0.12	3.03	-0.0012	-0.0035	0.0121	-0.0006	-0.0015	0.0059
1.199	0.04	3.23	-0.0012	-0.0037	0.0130	-0.0007	-0.0016	0.0062
1.198	0.03	4.00	-0.0015	-0.0044	0.0158	-0.0008	-0.0016	0.0068
1.197	0.03	5.48	-0.0020	-0.0062	0.0221	-0.0010	-0.0025	0.0102
1.198	0.05	6.20	-0.0020	-0.0067	0.0234	-0.0009	-0.0026	0.0100
1.199	0.05	7.29	-0.0022	-0.0071	0.0253	-0.0008	-0.0024	0.0096
1.200	0.04	8.04	-0.0023	-0.0075	0.0266	-0.0008	-0.0023	0.0094
0.902	0.02	0.96	0.0001	0.0001	0.0011	0.0001	0.0001	0.0011
0.897	0.01	2.00	-0.0010	-0.0038	0.0132	-0.0004	-0.0018	0.0072
0.898	0.02	3.19	-0.0012	-0.0048	0.0177	-0.0002	-0.0012	0.0058
0.900	0.04	4.00	-0.0017	-0.0067	0.0234	-0.0004	-0.0019	0.0074
0.900	0.04	5.03	-0.0022	-0.0083	0.0289	-0.0006	-0.0023	0.0095
0.901	0.03	6.03	-0.0026	-0.0096	0.0332	-0.0006	-0.0026	0.0101
0.899	0.05	6.99	-0.0029	-0.0110	0.0373	-0.0006	-0.0029	0.0106
0.901	0.01	0.96	0.0001	0.0001	0.0009	0.0001	0.0001	0.0009
0.902	4.01	0.96	0.0002	-0.0001	0.0010	0.0002	-0.0001	0.0010
0.901	8.01	0.95	0.0000	-0.0003	0.0021	0.0000	-0.0003	0.0021
0.900	12.01	0.94	0.0000	-0.0004	0.0031	0.0000	-0.0004	0.0031
0.900	0.04	6.06	-0.0026	-0.0096	0.0330	-0.0006	-0.0025	0.0098
0.900	4.05	6.07	-0.0027	-0.0099	0.0338	-0.0007	-0.0028	0.0105
0.899	8.02	6.03	-0.0027	-0.0100	0.0344	-0.0007	-0.0029	0.0112
0.904	11.99	6.06	-0.0028	-0.0102	0.0352	-0.0008	-0.0031	0.0121
0.804	0.01	0.96	0.0000	-0.0002	0.0011	0.0000	-0.0002	0.0011
0.802	0.04	2.02	-0.0014	-0.0050	0.0180	-0.0007	-0.0025	0.0105
0.803	0.06	3.22	-0.0016	-0.0064	0.0225	-0.0004	-0.0017	0.0074
0.800	0.17	4.54	-0.0025	-0.0095	0.0328	-0.0007	-0.0025	0.0106
0.802	0.08	5.52	-0.0030	-0.0111	0.0382	-0.0008	-0.0028	0.0114
0.599	0.00	1.00	-0.0006	-0.0010	0.0022	-0.0006	-0.0010	0.0022
0.602	0.01	2.00	-0.0025	-0.0086	0.0297	-0.0013	-0.0042	0.0165
0.600	0.02	3.22	-0.0031	-0.0110	0.0367	-0.0009	-0.0027	0.0096
0.600	0.03	4.00	-0.0039	-0.0142	0.0465	-0.0011	-0.0033	0.0106
0.600	0.03	5.00	-0.0048	-0.0172	0.0575	-0.0012	-0.0037	0.0140
0.600	0.02	4.83	-0.0047	-0.0168	0.0558	-0.0012	-0.0037	0.0137
0.600	0.02	5.49	-0.0052	-0.0185	0.0608	-0.0012	-0.0038	0.0132
0.600	0.00	1.00	-0.0007	-0.0011	0.0043	-0.0007	-0.0011	0.0043
0.600	4.02	1.00	-0.0007	-0.0015	0.0051	-0.0007	-0.0015	0.0051
0.599	8.00	1.00	-0.0007	-0.0019	0.0064	-0.0007	-0.0019	0.0064
0.599	12.00	1.00	-0.0008	-0.0019	0.0073	-0.0008	-0.0019	0.0073
0.599	0.05	4.85	-0.0048	-0.0170	0.0567	-0.0012	-0.0038	0.0143
0.600	4.03	4.81	-0.0048	-0.0175	0.0588	-0.0014	-0.0045	0.0170
0.600	8.05	4.80	-0.0049	-0.0180	0.0591	-0.0014	-0.0049	0.0174
0.600	12.03	4.82	-0.0049	-0.0185	0.0607	-0.0014	-0.0054	0.0188
0.598	20.02	1.00	-0.0004	-0.0013	0.0037	-0.0004	-0.0013	0.0037
0.597	20.13	1.98	-0.0026	-0.0103	0.0358	-0.0014	-0.0057	0.0226
0.598	20.05	3.22	-0.0034	-0.0135	0.0451	-0.0012	-0.0049	0.0181
0.598	20.04	4.79	-0.0048	-0.0184	0.0593	-0.0013	-0.0053	0.0176
0.598	20.08	5.49	-0.0054	-0.0202	0.0658	-0.0013	-0.0054	0.0183

Table 22. Concluded

(b) Concluded

MACH	ALPHA	NPR	CR	CN	CY	CRA	CNA	CYA
0.201	0.00	1.00	0.0000	-0.0006	0.0074	0.0000	-0.0006	0.0074
0.201	-0.01	1.51	-0.0058	-0.0243	0.0654	0.0014	0.0006	-0.0031
0.201	0.02	2.01	-0.0122	-0.0446	0.1457	-0.0014	-0.0054	0.0275
0.202	0.02	2.61	-0.0182	-0.0626	0.2189	-0.0032	-0.0067	0.0419
0.200	0.00	3.20	-0.0203	-0.0766	0.2603	-0.0007	-0.0025	0.0200
0.201	0.02	4.00	-0.0265	-0.0998	0.3301	-0.0012	-0.0030	0.0108
0.202	-0.01	1.00	-0.0005	-0.0009	0.0077	-0.0005	-0.0009	0.0077
0.202	4.02	1.00	-0.0020	-0.0031	0.0095	-0.0020	-0.0031	0.0095
0.202	8.00	1.00	-0.0007	-0.0041	0.0109	-0.0007	-0.0041	0.0109
0.201	12.00	1.00	-0.0008	-0.0047	0.0157	-0.0008	-0.0047	0.0157
0.201	14.53	1.00	-0.0009	-0.0050	0.0212	-0.0009	-0.0050	0.0212
0.202	0.03	3.26	-0.0218	-0.0789	0.2634	-0.0020	-0.0039	0.0200
0.202	4.02	3.23	-0.0216	-0.0775	0.2592	-0.0021	-0.0036	0.0194
0.202	8.02	3.23	-0.0216	-0.0789	0.2587	-0.0022	-0.0049	0.0190
0.201	12.02	3.22	-0.0220	-0.0799	0.2681	-0.0024	-0.0057	0.0274
0.202	14.52	3.22	-0.0221	-0.0800	0.2771	-0.0026	-0.0061	0.0374
0.200	12.49	1.01	-0.0007	-0.0047	0.0214	-0.0007	-0.0047	0.0214
0.201	20.01	1.01	-0.0008	-0.0050	0.0201	-0.0008	-0.0050	0.0201
0.200	11.98	1.00	-0.0003	-0.0049	0.0055	-0.0003	-0.0049	0.0055
0.201	14.52	1.00	-0.0003	-0.0049	0.0034	-0.0003	-0.0049	0.0034
0.201	16.00	1.00	-0.0002	-0.0049	0.0043	-0.0002	-0.0049	0.0043
0.201	20.02	1.00	-0.0003	-0.0055	0.0070	-0.0003	-0.0055	0.0070
0.201	24.01	1.00	-0.0003	-0.0050	0.0076	-0.0003	-0.0050	0.0076
0.201	26.99	1.00	-0.0004	-0.0047	0.0095	-0.0004	-0.0047	0.0095
0.200	12.01	3.20	-0.0208	-0.0813	0.2650	-0.0014	-0.0052	0.0270
0.201	14.51	3.21	-0.0206	-0.0813	0.2598	-0.0012	-0.0052	0.0214
0.200	16.03	3.21	-0.0208	-0.0822	0.2657	-0.0012	-0.0053	0.0249
0.199	20.00	3.21	-0.0213	-0.0829	0.2665	-0.0015	-0.0054	0.0239
0.200	24.01	3.21	-0.0210	-0.0826	0.2690	-0.0014	-0.0058	0.0286
0.200	27.02	3.21	-0.0212	-0.0829	0.2769	-0.0016	-0.0061	0.0365
0.199	20.01	1.01	-0.0003	-0.0054	0.0058	-0.0003	-0.0054	0.0058
0.199	20.02	2.00	-0.0130	-0.0502	0.1600	-0.0024	-0.0088	0.0395
0.199	20.01	2.58	-0.0179	-0.0692	0.2309	-0.0028	-0.0103	0.0513
0.199	20.02	3.19	-0.0217	-0.0824	0.2636	-0.0021	-0.0057	0.0237
0.199	20.07	3.99	-0.0272	-0.1051	0.3339	-0.0016	-0.0049	0.0146

Table 23. Longitudinal Aerodynamic Characteristics for Standard Nozzle With $\theta = 30^\circ$,
 $\delta_{v,p,l} = -30^\circ$, $\delta_{v,p,r} = 30^\circ$, and $\beta = 0^\circ$

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
0.898	0.01	0.91	-0.0074	0.0141	0.0029	-0.0074	0.0141	0.0029
0.900	0.04	2.03	-0.0084	0.0007	0.0048	-0.0084	0.0173	0.0048
0.898	0.03	3.18	-0.0060	-0.0154	0.0030	-0.0060	0.0201	0.0030
0.901	0.05	4.00	-0.0061	-0.0310	0.0020	-0.0062	0.0169	0.0020
0.899	0.03	5.01	-0.0041	-0.0499	0.0013	-0.0041	0.0173	0.0013
0.897	0.04	6.00	-0.0045	-0.0686	0.0009	-0.0045	0.0178	0.0009
0.899	0.07	6.99	-0.0045	-0.0867	0.0006	-0.0046	0.0183	0.0006
0.900	0.01	0.93	-0.0066	0.0147	0.0022	-0.0066	0.0147	0.0022
0.899	4.03	0.93	-0.0011	0.0150	-0.0032	-0.0011	0.0150	-0.0032
0.900	8.01	0.93	0.0082	0.0172	-0.0090	0.0082	0.0172	-0.0090
0.898	11.01	0.92	0.0150	0.0202	-0.0133	0.0150	0.0202	-0.0133
0.900	0.04	6.00	-0.0046	-0.0678	0.0011	-0.0047	0.0179	0.0011
0.900	4.05	6.00	0.0092	-0.0670	-0.0055	0.0031	0.0185	-0.0055
0.900	8.06	6.00	0.0238	-0.0640	-0.0114	0.0117	0.0210	-0.0114
0.897	10.49	5.99	0.0325	-0.0619	-0.0150	0.0168	0.0229	-0.0150
0.803	0.02	0.93	-0.0105	0.0158	0.0044	-0.0105	0.0158	0.0044
0.800	0.02	1.97	-0.0088	-0.0008	0.0035	-0.0088	0.0190	0.0035
0.801	0.03	3.19	-0.0035	-0.0211	0.0001	-0.0035	0.0236	0.0001
0.801	0.06	4.50	-0.0048	-0.0548	0.0011	-0.0049	0.0174	0.0011
0.800	0.07	5.48	-0.0051	-0.0785	0.0011	-0.0052	0.0176	0.0011
0.601	0.02	0.97	-0.0198	0.0152	0.0113	-0.0198	0.0152	0.0113
0.598	0.02	2.00	-0.0041	-0.0153	-0.0012	-0.0041	0.0212	-0.0012
0.600	0.02	3.20	-0.0033	-0.0554	-0.0015	-0.0033	0.0250	-0.0015
0.600	0.05	4.01	-0.0065	-0.0901	0.0010	-0.0066	0.0184	0.0010
0.600	0.06	4.81	-0.0079	-0.1239	0.0024	-0.0080	0.0180	0.0024
0.600	0.08	5.50	-0.0083	-0.1538	0.0024	-0.0085	0.0177	0.0024
0.600	0.04	0.98	-0.0210	0.0152	0.0118	-0.0210	0.0152	0.0118
0.601	4.03	0.98	-0.0161	0.0143	0.0081	-0.0161	0.0143	0.0081
0.601	8.02	0.98	-0.0092	0.0150	0.0034	-0.0092	0.0150	0.0034
0.601	11.45	0.98	-0.0020	0.0168	-0.0006	-0.0020	0.0168	-0.0006
0.602	0.06	4.80	-0.0076	-0.1227	0.0026	-0.0078	0.0178	0.0026
0.603	4.05	4.80	0.0091	-0.1219	-0.0022	-0.0008	0.0183	-0.0022
0.602	8.07	4.80	0.0275	-0.1191	-0.0084	0.0078	0.0202	-0.0084
0.601	11.71	4.80	0.0463	-0.1140	-0.0144	0.0177	0.0240	-0.0144

Table 23. Concluded

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
0.203	0.01	0.99	-0.0182	0.0096	0.0085	-0.0182	0.0096	0.0085
0.200	0.03	1.50	-0.0260	-0.1543	-0.0006	-0.0261	0.0235	-0.0006
0.201	0.03	2.00	-0.0044	-0.2891	-0.0071	-0.0045	0.0338	-0.0071
0.201	0.03	2.60	-0.0070	-0.4835	-0.0053	-0.0073	0.0165	-0.0053
0.201	0.03	3.23	-0.0136	-0.6845	-0.0033	-0.0140	0.0341	-0.0033
0.202	0.06	4.02	0.0022	-0.9370	-0.0004	0.0012	0.0235	-0.0004
0.200	0.01	1.00	-0.0272	0.0102	0.0134	-0.0272	0.0102	0.0134
0.200	4.01	1.00	-0.0155	0.0081	-0.0022	-0.0155	0.0081	-0.0022
0.200	8.02	1.00	0.0096	0.0178	-0.0076	0.0096	0.0178	-0.0076
0.200	12.01	1.00	0.0081	0.0182	-0.0137	0.0081	0.0182	-0.0137
0.200	14.50	1.00	0.0256	0.0218	-0.0189	0.0256	0.0218	-0.0189
0.201	0.05	3.20	-0.0117	-0.6773	-0.0015	-0.0123	0.0345	-0.0015
0.201	4.06	3.20	0.0616	-0.6784	-0.0048	0.0109	0.0349	-0.0048
0.202	8.04	3.20	0.1129	-0.6647	-0.0136	0.0137	0.0377	-0.0136
0.201	12.04	3.20	0.1801	-0.6482	-0.0212	0.0315	0.0487	-0.0212
0.201	14.54	3.20	0.2179	-0.6399	-0.0265	0.0385	0.0519	-0.0265

Table 24. Aerodynamic Characteristics for Standard Nozzle With $\theta = 30^\circ$,
 $\delta_{v,p,l} = 0^\circ$, $\delta_{v,p,r} = 20^\circ$, and $\beta = 0^\circ$

(a) Longitudinal characteristics

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
1.201	-0.01	0.84	-0.0031	0.0189	-0.0003	-0.0031	0.0189	-0.0003
1.196	0.00	1.99	-0.0036	0.0037	-0.0005	-0.0064	0.0165	0.0018
1.199	-0.01	3.19	0.0009	-0.0095	-0.0049	-0.0040	0.0174	-0.0008
1.201	0.00	4.01	0.0031	-0.0194	-0.0067	-0.0032	0.0176	-0.0013
1.201	0.00	5.53	0.0072	-0.0382	-0.0097	-0.0017	0.0173	-0.0025
1.201	0.01	7.30	0.0112	-0.0606	-0.0126	-0.0012	0.0166	-0.0031
1.201	0.01	7.99	0.0130	-0.0696	-0.0136	-0.0007	0.0160	-0.0032
0.904	0.00	0.99	-0.0097	0.0109	0.0050	-0.0097	0.0109	0.0050
0.900	0.00	1.97	0.0014	-0.0122	-0.0061	-0.0034	0.0098	-0.0020
0.901	-0.01	3.23	0.0063	-0.0390	-0.0097	-0.0025	0.0093	-0.0021
0.900	0.01	4.05	0.0117	-0.0568	-0.0141	0.0004	0.0098	-0.0045
0.901	0.01	5.03	0.0167	-0.0781	-0.0176	0.0027	0.0095	-0.0060
0.900	0.00	6.00	0.0211	-0.0996	-0.0209	0.0036	0.0094	-0.0070
0.900	0.01	6.99	0.0246	-0.1220	-0.0241	0.0037	0.0089	-0.0080
0.900	0.01	1.01	-0.0098	0.0104	0.0046	-0.0098	0.0104	0.0046
0.900	4.02	1.01	-0.0072	0.0106	0.0022	-0.0072	0.0106	0.0022
0.899	8.00	1.01	0.0020	0.0123	-0.0031	0.0020	0.0123	-0.0031
0.900	12.01	1.01	0.0115	0.0164	-0.0091	0.0115	0.0164	-0.0091
0.900	0.03	6.01	0.0195	-0.1003	-0.0209	0.0019	0.0091	-0.0070
0.901	4.01	6.03	0.0307	-0.0983	-0.0230	0.0056	0.0096	-0.0091
0.899	8.01	6.01	0.0465	-0.0940	-0.0280	0.0138	0.0120	-0.0141
0.900	12.03	6.03	0.0652	-0.0862	-0.0346	0.0252	0.0172	-0.0207
0.801	0.01	1.02	-0.0074	0.0086	0.0016	-0.0074	0.0086	0.0016
0.800	0.01	1.98	0.0081	-0.0194	-0.0113	0.0019	0.0088	-0.0061
0.800	0.00	3.23	0.0115	-0.0531	-0.0144	0.0004	0.0081	-0.0049
0.800	0.00	4.53	0.0211	-0.0886	-0.0211	0.0050	0.0089	-0.0076
0.800	0.00	5.50	0.0251	-0.1155	-0.0250	0.0052	0.0085	-0.0089
0.600	0.00	1.00	-0.0027	0.0080	-0.0004	-0.0027	0.0080	-0.0004
0.601	0.00	1.97	0.0233	-0.0410	-0.0233	0.0124	0.0086	-0.0143
0.601	0.01	3.23	0.0241	-0.1010	-0.0257	0.0043	0.0078	-0.0088
0.599	0.02	4.01	0.0329	-0.1399	-0.0322	0.0077	0.0083	-0.0109
0.601	0.03	4.81	0.0391	-0.1781	-0.0371	0.0091	0.0079	-0.0122
0.600	0.02	5.51	0.0455	-0.2140	-0.0413	0.0098	0.0076	-0.0126
0.601	0.00	1.01	-0.0064	0.0078	0.0001	-0.0064	0.0078	0.0001
0.602	4.02	1.01	-0.0024	0.0083	-0.0024	-0.0024	0.0083	-0.0024
0.598	7.99	1.01	0.0084	0.0099	-0.0092	0.0084	0.0099	-0.0092
0.600	12.01	1.01	0.0141	0.0138	-0.0132	0.0141	0.0138	-0.0132
0.600	0.03	4.82	0.0400	-0.1798	-0.0372	0.0097	0.0078	-0.0121
0.600	4.01	4.83	0.0583	-0.1761	-0.0400	0.0150	0.0090	-0.0149
0.601	7.99	4.84	0.0783	-0.1695	-0.0443	0.0224	0.0118	-0.0192
0.601	12.02	4.83	0.1032	-0.1588	-0.0525	0.0347	0.0181	-0.0275
0.600	19.99	1.00	0.0491	0.0260	-0.0338	0.0491	0.0260	-0.0338
0.598	20.01	2.00	0.0905	-0.0115	-0.0538	0.0620	0.0324	-0.0444
0.599	20.02	3.20	0.1150	-0.0640	-0.0585	0.0593	0.0302	-0.0414
0.598	19.99	4.80	0.1568	-0.1326	-0.0711	0.0651	0.0330	-0.0454
0.597	20.00	5.51	0.1740	-0.1647	-0.0759	0.0631	0.0319	-0.0467

Table 24. Continued

(a) Concluded

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
0.200	0.02	1.00	-0.0162	0.0087	-0.0014	-0.0162	0.0087	-0.0014
0.200	0.02	1.53	0.0419	-0.2502	-0.0609	-0.0016	0.0079	-0.0176
0.201	0.02	2.07	0.1056	-0.4765	-0.1102	-0.0038	0.0109	-0.0205
0.201	0.03	2.65	0.1646	-0.7117	-0.1488	0.0229	0.0167	-0.0261
0.199	0.02	3.20	0.1915	-0.9709	-0.1663	0.0127	0.0080	-0.0136
0.199	0.02	4.00	0.2352	-1.3190	-0.2085	0.0073	0.0155	-0.0165
0.198	0.00	1.00	-0.0148	0.0080	-0.0011	-0.0148	0.0080	-0.0011
0.198	4.01	1.00	-0.0069	0.0058	-0.0077	-0.0069	0.0058	-0.0077
0.199	7.98	1.00	0.0124	0.0068	-0.0137	0.0124	0.0068	-0.0137
0.199	12.00	1.00	0.0182	0.0167	-0.0246	0.0182	0.0167	-0.0246
0.202	14.52	1.00	0.0349	0.0196	-0.0289	0.0349	0.0196	-0.0289
0.199	0.01	3.23	0.1922	-0.9815	-0.1651	0.0121	0.0083	-0.0112
0.200	4.02	3.23	0.2592	-0.9542	-0.1650	0.0127	0.0116	-0.0126
0.200	8.01	3.24	0.3344	-0.9312	-0.1707	0.0216	0.0141	-0.0185
0.200	12.02	3.24	0.4172	-0.9036	-0.1778	0.0380	0.0199	-0.0252
0.200	14.52	3.24	0.4546	-0.8832	-0.1859	0.0356	0.0229	-0.0333
0.200	12.01	0.99	0.0246	0.0094	-0.0219	0.0246	0.0094	-0.0219
0.201	14.50	0.99	0.0408	0.0111	-0.0263	0.0408	0.0111	-0.0263
0.201	16.00	1.00	0.0487	0.0158	-0.0261	0.0487	0.0158	-0.0261
0.201	20.01	1.00	0.0583	0.0216	-0.0369	0.0583	0.0216	-0.0369
0.201	24.02	1.00	0.0829	0.0347	-0.0446	0.0829	0.0347	-0.0446
0.201	27.00	1.00	0.0871	0.0364	-0.0512	0.0871	0.0364	-0.0512
0.202	12.01	3.23	0.4000	-0.8768	-0.1726	0.0273	0.0196	-0.0222
0.202	14.50	3.23	0.4575	-0.8604	-0.1784	0.0450	0.0217	-0.0276
0.202	16.02	3.23	0.4767	-0.8463	-0.1820	0.0408	0.0247	-0.0311
0.202	20.01	3.23	0.5600	-0.8103	-0.1942	0.0634	0.0304	-0.0429
0.202	24.02	3.23	0.6396	-0.7593	-0.2050	0.0853	0.0445	-0.0537
0.202	27.01	3.23	0.6717	-0.7241	-0.2132	0.0791	0.0463	-0.0627
0.203	19.98	1.00	0.0603	0.0234	-0.0347	0.0603	0.0234	-0.0347
0.203	20.00	2.00	0.3117	-0.3399	-0.1345	0.0639	0.0422	-0.0524
0.203	20.00	2.63	0.4416	-0.5622	-0.1772	0.0676	0.0489	-0.0556
0.202	20.00	3.20	0.5548	-0.7941	-0.1923	0.0665	0.0318	-0.0431
0.203	20.02	4.00	0.7225	-1.0870	-0.2322	0.0762	0.0398	-0.0467

Table 24. Continued

(b) Lateral characteristics

MACH	ALPHA	NPR	CR	CN	CY	CRA	CNA	CYA
1.201	-0.01	0.84	-0.0001	0.0005	0.0011	-0.0001	0.0005	0.0011
1.196	0.00	1.99	-0.0003	-0.0002	0.0033	-0.0001	0.0004	0.0012
1.199	-0.01	3.19	-0.0005	-0.0008	0.0053	-0.0002	0.0003	0.0015
1.201	0.00	4.01	-0.0005	-0.0011	0.0061	-0.0001	0.0002	0.0014
1.201	0.00	5.53	-0.0007	-0.0018	0.0090	-0.0002	0.0000	0.0024
1.201	0.01	7.30	-0.0010	-0.0027	0.0130	-0.0002	-0.0003	0.0043
1.201	0.01	7.99	-0.0010	-0.0030	0.0141	-0.0002	-0.0004	0.0046
0.904	0.00	0.99	0.0000	0.0006	0.0013	0.0000	0.0006	0.0013
0.900	0.00	1.97	-0.0005	-0.0012	0.0070	-0.0002	-0.0002	0.0033
0.901	-0.01	3.23	-0.0007	-0.0019	0.0090	-0.0001	0.0000	0.0022
0.900	0.01	4.05	-0.0009	-0.0027	0.0130	-0.0002	-0.0003	0.0045
0.901	0.01	5.03	-0.0010	-0.0034	0.0158	-0.0001	-0.0005	0.0052
0.900	0.00	6.00	-0.0012	-0.0041	0.0180	-0.0002	-0.0006	0.0053
0.900	0.01	6.99	-0.0015	-0.0048	0.0207	-0.0002	-0.0007	0.0059
0.900	0.01	1.01	0.0000	0.0007	0.0005	0.0000	0.0007	0.0005
0.900	4.02	1.01	-0.0001	0.0008	-0.0002	-0.0001	0.0008	-0.0002
0.899	8.00	1.01	0.0001	0.0008	-0.0004	0.0001	0.0008	-0.0004
0.900	12.01	1.01	0.0001	0.0008	-0.0004	0.0001	0.0008	-0.0004
0.900	0.03	6.01	-0.0012	-0.0041	0.0179	-0.0001	-0.0005	0.0051
0.901	4.01	6.03	-0.0014	-0.0043	0.0181	-0.0003	-0.0008	0.0054
0.899	8.01	6.01	-0.0014	-0.0046	0.0185	-0.0003	-0.0011	0.0057
0.900	12.03	6.03	-0.0014	-0.0049	0.0199	-0.0003	-0.0014	0.0072
0.801	0.01	1.02	0.0001	0.0010	-0.0005	0.0001	0.0010	-0.0005
0.800	0.01	1.98	-0.0007	-0.0017	0.0082	-0.0003	-0.0004	0.0035
0.800	0.00	3.23	-0.0008	-0.0024	0.0109	-0.0001	0.0000	0.0023
0.800	0.00	4.53	-0.0011	-0.0038	0.0164	-0.0001	-0.0005	0.0043
0.800	0.00	5.50	-0.0014	-0.0047	0.0203	-0.0002	-0.0007	0.0056
0.600	0.00	1.00	0.0001	0.0008	-0.0003	0.0001	0.0008	-0.0003
0.601	0.00	1.97	-0.0012	-0.0039	0.0170	-0.0006	-0.0016	0.0087
0.601	0.01	3.23	-0.0016	-0.0048	0.0207	-0.0004	-0.0005	0.0053
0.599	0.02	4.01	-0.0020	-0.0063	0.0256	-0.0004	-0.0011	0.0065
0.601	0.03	4.81	-0.0024	-0.0076	0.0306	-0.0005	-0.0013	0.0078
0.600	0.02	5.51	-0.0027	-0.0087	0.0339	-0.0005	-0.0014	0.0076
0.601	0.00	1.01	-0.0001	0.0009	-0.0004	-0.0001	0.0009	-0.0004
0.602	4.02	1.01	-0.0002	0.0005	-0.0003	-0.0002	0.0005	-0.0003
0.598	7.99	1.01	-0.0003	-0.0005	0.0019	-0.0003	-0.0005	0.0019
0.600	12.01	1.01	-0.0001	-0.0001	0.0000	-0.0001	-0.0001	0.0000
0.600	0.03	4.82	-0.0024	-0.0076	0.0306	-0.0005	-0.0013	0.0076
0.600	4.01	4.83	-0.0024	-0.0082	0.0310	-0.0005	-0.0019	0.0081
0.601	7.99	4.84	-0.0024	-0.0087	0.0328	-0.0005	-0.0024	0.0099
0.601	12.02	4.83	-0.0024	-0.0093	0.0342	-0.0005	-0.0030	0.0113
0.600	19.99	1.00	-0.0003	-0.0015	0.0072	-0.0003	-0.0015	0.0072
0.598	20.01	2.00	-0.0013	-0.0057	0.0227	-0.0006	-0.0033	0.0145
0.599	20.02	3.20	-0.0016	-0.0065	0.0255	-0.0005	-0.0022	0.0106
0.598	19.99	4.80	-0.0024	-0.0092	0.0337	-0.0006	-0.0028	0.0104
0.597	20.00	5.51	-0.0027	-0.0102	0.0367	-0.0006	-0.0027	0.0095

Table 24. Concluded

(b) Concluded

MACH	ALPHA	NPR	CR	CN	CY	CRA	CNA	CYA
0.200	0.02	1.00	0.0001	0.0009	-0.0003	0.0001	0.0009	-0.0003
0.200	0.02	1.53	-0.0047	-0.0136	0.0464	-0.0008	-0.0028	0.0068
0.201	0.02	2.07	-0.0077	-0.0251	0.0892	-0.0017	-0.0027	0.0071
0.201	0.03	2.65	-0.0108	-0.0335	0.1318	-0.0025	-0.0034	0.0238
0.199	0.02	3.20	-0.0118	-0.0386	0.1557	-0.0010	0.0003	0.0171
0.199	0.02	4.00	-0.0143	-0.0495	0.1817	-0.0003	-0.0022	0.0095
0.198	0.00	1.00	-0.0011	0.0010	0.0002	-0.0011	0.0010	0.0002
0.198	4.01	1.00	-0.0013	-0.0018	0.0014	-0.0013	-0.0018	0.0014
0.199	7.98	1.00	-0.0004	-0.0033	0.0013	-0.0004	-0.0033	0.0013
0.199	12.00	1.00	-0.0003	-0.0047	0.0016	-0.0003	-0.0047	0.0016
0.202	14.52	1.00	0.0000	-0.0059	0.0127	0.0000	-0.0059	0.0127
0.199	0.01	3.23	-0.0117	-0.0391	0.1523	-0.0008	0.0001	0.0124
0.200	4.02	3.23	-0.0111	-0.0398	0.1385	-0.0003	-0.0010	0.0000
0.200	8.01	3.24	-0.0115	-0.0410	0.1519	-0.0007	-0.0022	0.0135
0.200	12.02	3.24	-0.0114	-0.0432	0.1539	-0.0006	-0.0043	0.0152
0.200	14.52	3.24	-0.0112	-0.0443	0.1555	-0.0004	-0.0054	0.0168
0.200	12.01	0.99	-0.0011	-0.0028	0.0124	-0.0011	-0.0028	0.0124
0.201	14.50	0.99	-0.0012	-0.0027	0.0122	-0.0012	-0.0027	0.0122
0.201	16.00	1.00	-0.0008	-0.0031	0.0121	-0.0008	-0.0031	0.0121
0.201	20.01	1.00	-0.0009	-0.0030	0.0122	-0.0009	-0.0030	0.0122
0.201	24.02	1.00	0.0001	-0.0025	0.0112	0.0001	-0.0025	0.0112
0.201	27.00	1.00	-0.0002	-0.0030	0.0105	-0.0002	-0.0030	0.0105
0.202	12.01	3.23	-0.0109	-0.0403	0.1447	-0.0005	-0.0022	0.0129
0.202	14.50	3.23	-0.0111	-0.0408	0.1463	-0.0007	-0.0026	0.0141
0.202	16.02	3.23	-0.0109	-0.0410	0.1453	-0.0006	-0.0027	0.0131
0.202	20.01	3.23	-0.0110	-0.0411	0.1466	-0.0006	-0.0028	0.0141
0.202	24.02	3.23	-0.0111	-0.0414	0.1467	-0.0007	-0.0031	0.0141
0.202	27.01	3.23	-0.0108	-0.0416	0.1474	-0.0005	-0.0034	0.0155
0.203	19.98	1.00	-0.0012	-0.0029	0.0132	-0.0012	-0.0029	0.0132
0.203	20.00	2.00	-0.0073	-0.0265	0.0964	-0.0013	-0.0060	0.0248
0.203	20.00	2.63	-0.0105	-0.0367	0.1371	-0.0023	-0.0074	0.0317
0.202	20.00	3.20	-0.0109	-0.0404	0.1456	-0.0007	-0.0027	0.0150
0.203	20.02	4.00	-0.0140	-0.0509	0.1878	-0.0010	-0.0057	0.0200

Table 25. Aerodynamic Characteristics for Standard Nozzle With $\theta = 30^\circ$,
 $\delta_{v,p,l} = 0^\circ$, $\delta_{v,p,r} = 0^\circ$, and $\beta = 5^\circ$

(a) Longitudinal characteristics

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
1.205	-0.05	0.85	0.1001	0.0178	0.0073	0.1001	0.0178	0.0073
1.200	-0.03	1.97	0.1005	0.0018	0.0069	0.1005	0.0155	0.0069
1.199	-0.04	3.20	0.1008	-0.0131	0.0064	0.1008	0.0163	0.0064
1.199	-0.04	4.03	0.1003	-0.0237	0.0066	0.1004	0.0162	0.0066
1.200	-0.03	5.52	0.0993	-0.0443	0.0074	0.0993	0.0146	0.0074
1.200	-0.03	7.27	0.0985	-0.0683	0.0076	0.0986	0.0128	0.0076
1.199	-0.03	7.99	0.0985	-0.0784	0.0076	0.0985	0.0120	0.0076
0.900	-0.06	1.02	0.1271	0.0046	0.0065	0.1271	0.0046	0.0065
0.901	-0.06	1.99	0.1299	-0.0214	0.0044	0.1299	0.0032	0.0044
0.900	-0.06	3.20	0.1299	-0.0492	0.0040	0.1299	0.0030	0.0040
0.900	-0.06	3.99	0.1295	-0.0676	0.0039	0.1295	0.0024	0.0039
0.899	-0.06	4.95	0.1289	-0.0895	0.0039	0.1290	0.0024	0.0039
0.899	-0.06	5.98	0.1292	-0.1138	0.0040	0.1293	0.0014	0.0040
0.901	-0.06	7.02	0.1293	-0.1374	0.0040	0.1294	0.0009	0.0040
0.898	-0.05	1.04	0.1265	0.0044	0.0071	0.1265	0.0044	0.0071
0.896	3.95	1.04	0.1351	0.0137	0.0013	0.1351	0.0137	0.0013
0.901	7.94	1.04	0.1401	0.0257	-0.0021	0.1401	0.0257	-0.0021
0.899	11.73	1.04	0.1491	0.0378	-0.0077	0.1491	0.0378	-0.0077
0.901	-0.02	6.02	0.1284	-0.1138	0.0039	0.1285	0.0018	0.0039
0.898	3.97	6.00	0.1415	-0.1047	0.0014	0.1335	0.0111	0.0014
0.899	7.94	6.01	0.1570	-0.0928	-0.0028	0.1410	0.0221	-0.0028
0.899	11.43	6.01	0.1713	-0.0806	-0.0066	0.1483	0.0331	-0.0066
0.801	-0.04	1.07	0.1502	0.0000	0.0034	0.1502	0.0000	0.0034
0.800	-0.04	1.99	0.1507	-0.0312	0.0030	0.1507	0.0002	0.0030
0.800	-0.05	3.23	0.1500	-0.0666	0.0036	0.1501	0.0004	0.0036
0.796	0.01	1.07	-0.0090	0.0063	0.0035	-0.0090	0.0063	0.0035
0.800	0.03	1.99	-0.0076	-0.0241	0.0027	-0.0076	0.0072	0.0027
0.799	0.02	3.21	-0.0085	-0.0592	0.0035	-0.0085	0.0071	0.0035
0.799	0.02	4.48	-0.0083	-0.0962	0.0037	-0.0083	0.0067	0.0037
0.791	0.02	5.49	-0.0083	-0.1284	0.0038	-0.0083	0.0061	0.0038
0.600	-0.01	1.02	-0.0067	0.0066	0.0026	-0.0067	0.0066	0.0026
0.603	0.00	1.99	-0.0073	-0.0478	0.0027	-0.0073	0.0073	0.0027
0.601	0.00	3.27	-0.0088	-0.1133	0.0032	-0.0088	0.0072	0.0032
0.600	0.01	3.94	-0.0101	-0.1486	0.0038	-0.0101	0.0066	0.0038
0.601	0.01	4.73	-0.0111	-0.1884	0.0043	-0.0112	0.0063	0.0043
0.599	0.02	5.43	-0.0121	-0.2257	0.0046	-0.0122	0.0060	0.0046
0.599	-0.01	1.04	-0.0091	0.0067	0.0032	-0.0091	0.0067	0.0032
0.599	4.02	1.04	-0.0053	0.0072	0.0017	-0.0053	0.0072	0.0017
0.601	7.99	1.04	-0.0011	0.0077	-0.0014	-0.0011	0.0077	-0.0014
0.600	11.77	1.04	0.0109	0.0118	-0.0074	0.0109	0.0118	-0.0074
0.601	0.03	4.74	-0.0112	-0.1877	0.0045	-0.0113	0.0074	0.0045
0.601	4.01	4.80	0.0061	-0.1903	0.0026	-0.0077	0.0072	0.0026
0.600	7.99	4.81	0.0285	-0.1893	-0.0022	0.0009	0.0078	-0.0022
0.599	11.78	4.75	0.0537	-0.1823	-0.0091	0.0135	0.0103	-0.0091

Table 25. Continued

(a) Concluded

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
0.202	0.00	1.00	-0.0092	0.0047	0.0010	-0.0092	0.0047	0.0010
0.201	0.01	1.56	-0.0209	-0.3016	-0.0003	-0.0210	-0.0001	-0.0003
0.200	0.02	2.02	-0.0237	-0.5031	0.0055	-0.0239	0.0083	0.0055
0.201	0.00	2.60	-0.0311	-0.7603	0.0089	-0.0311	0.0137	0.0089
0.199	0.01	3.17	-0.0385	-1.0390	0.0114	-0.0388	0.0126	0.0114
0.200	0.02	3.94	-0.0399	-1.3780	0.0143	-0.0404	0.0169	0.0143
0.198	-0.01	1.01	-0.0096	0.0050	0.0016	-0.0096	0.0050	0.0016
0.199	4.01	1.00	-0.0029	0.0041	0.0002	-0.0029	0.0041	0.0002
0.199	7.98	1.00	-0.0031	0.0099	-0.0048	-0.0031	0.0099	-0.0048
0.198	12.01	1.00	0.0165	0.0132	-0.0132	0.0165	0.0132	-0.0132
0.202	14.50	1.00	0.0196	0.0117	-0.0182	0.0196	0.0117	-0.0182
0.200	0.05	3.18	-0.0379	-1.0270	0.0127	-0.0388	0.0206	0.0127
0.199	4.02	3.22	0.0621	-1.0600	0.0113	-0.0130	0.0097	0.0113
0.199	7.99	3.17	0.1337	-1.0260	0.0037	-0.0122	0.0130	0.0037
0.199	12.01	3.21	0.2296	-1.0140	-0.0048	0.0081	0.0270	-0.0048
0.200	14.50	3.22	0.2733	-1.0010	-0.0125	0.0077	0.0255	-0.0125

Table 25. Continued

(b) Lateral characteristics

MACH	ALPHA	NPR	CR	CN	CY	CRA	CNA	CYA
1.205	-0.05	0.85	0.0002	0.0005	-0.0019	0.0002	0.0005	-0.0019
1.200	-0.03	1.97	0.0001	0.0000	-0.0004	0.0001	0.0000	-0.0004
1.199	-0.04	3.20	0.0001	0.0000	-0.0004	0.0001	0.0000	-0.0004
1.199	-0.04	4.03	0.0001	0.0000	-0.0005	0.0001	0.0000	-0.0005
1.200	-0.03	5.52	0.0001	0.0000	-0.0004	0.0001	0.0000	-0.0004
1.200	-0.03	7.27	0.0001	0.0000	-0.0004	0.0001	0.0000	-0.0004
1.199	-0.03	7.99	0.0001	0.0000	-0.0003	0.0001	0.0000	-0.0003
0.900	-0.06	1.02	0.0000	-0.0006	0.0015	0.0000	-0.0006	0.0015
0.901	-0.06	1.99	0.0000	-0.0012	0.0033	0.0000	-0.0012	0.0033
0.900	-0.06	3.20	0.0001	-0.0011	0.0030	0.0001	-0.0011	0.0030
0.900	-0.06	3.99	0.0001	-0.0011	0.0031	0.0001	-0.0011	0.0031
0.899	-0.06	4.95	0.0001	-0.0011	0.0029	0.0001	-0.0011	0.0029
0.899	-0.06	5.98	0.0001	-0.0010	0.0030	0.0001	-0.0010	0.0030
0.901	-0.06	7.02	0.0001	-0.0010	0.0027	0.0001	-0.0010	0.0027
0.898	-0.05	1.04	0.0000	-0.0005	0.0011	0.0000	-0.0005	0.0011
0.896	3.95	1.04	-0.0003	-0.0008	-0.0010	-0.0003	-0.0008	-0.0010
0.901	7.94	1.04	-0.0007	-0.0003	-0.0033	-0.0007	-0.0003	-0.0033
0.899	11.73	1.04	-0.0010	0.0004	-0.0073	-0.0010	0.0004	-0.0073
0.901	-0.02	6.02	0.0001	-0.0010	0.0017	0.0001	-0.0010	0.0017
0.898	3.97	6.00	-0.0003	-0.0008	0.0002	-0.0003	-0.0008	0.0002
0.899	7.94	6.01	-0.0007	-0.0004	-0.0026	-0.0007	-0.0004	-0.0026
0.899	11.43	6.01	-0.0010	0.0003	-0.0069	-0.0010	0.0003	-0.0069
0.801	-0.04	1.07	-0.0001	-0.0017	0.0040	-0.0001	-0.0017	0.0040
0.800	-0.04	1.99	0.0000	-0.0016	0.0038	0.0000	-0.0016	0.0038
0.800	-0.05	3.23	0.0001	-0.0014	0.0031	0.0001	-0.0014	0.0031
0.796	0.01	1.07	0.0000	-0.0018	0.0067	0.0000	-0.0018	0.0067
0.800	0.03	1.99	0.0001	-0.0016	0.0065	0.0001	-0.0016	0.0065
0.799	0.02	3.21	0.0001	-0.0014	0.0062	0.0001	-0.0014	0.0062
0.799	0.02	4.48	0.0001	-0.0013	0.0062	0.0001	-0.0013	0.0062
0.791	0.02	5.49	0.0001	-0.0012	0.0062	0.0001	-0.0012	0.0062
0.600	-0.01	1.02	0.0002	-0.0014	0.0066	0.0002	-0.0014	0.0066
0.603	0.00	1.99	0.0002	-0.0013	0.0056	0.0002	-0.0013	0.0056
0.601	0.00	3.27	0.0002	-0.0012	0.0049	0.0002	-0.0012	0.0049
0.600	0.01	3.94	0.0002	-0.0010	0.0045	0.0002	-0.0010	0.0045
0.601	0.01	4.73	0.0003	-0.0010	0.0039	0.0003	-0.0010	0.0039
0.599	0.02	5.43	0.0003	-0.0009	0.0037	0.0003	-0.0009	0.0037
0.599	-0.01	1.04	0.0002	-0.0013	0.0041	0.0002	-0.0013	0.0041
0.599	4.02	1.04	-0.0003	-0.0012	0.0043	-0.0003	-0.0012	0.0043
0.601	7.99	1.04	-0.0007	-0.0015	0.0048	-0.0007	-0.0015	0.0048
0.600	11.77	1.04	-0.0010	-0.0012	0.0031	-0.0010	-0.0012	0.0031
0.601	0.03	4.74	0.0003	-0.0010	0.0039	0.0003	-0.0010	0.0039
0.601	4.01	4.80	-0.0002	-0.0010	0.0041	-0.0002	-0.0010	0.0041
0.600	7.99	4.81	-0.0007	-0.0012	0.0047	-0.0007	-0.0012	0.0047
0.599	11.78	4.75	-0.0012	-0.0011	0.0029	-0.0012	-0.0011	0.0029

Table 25. Concluded

(b) Concluded

MACH	ALPHA	NPR	CR	CN	CY	CRA	CNA	CYA
0.202	0.00	1.00	0.0008	-0.0009	0.0058	0.0008	-0.0009	0.0058
0.201	0.01	1.56	0.0008	-0.0017	0.0060	0.0008	-0.0017	0.0060
0.200	0.02	2.02	0.0010	-0.0011	0.0067	0.0010	-0.0011	0.0067
0.201	0.00	2.60	0.0009	-0.0011	0.0067	0.0009	-0.0011	0.0067
0.199	0.01	3.17	0.0011	-0.0007	0.0054	0.0011	-0.0007	0.0054
0.200	0.02	3.94	0.0011	-0.0002	0.0060	0.0011	-0.0002	0.0060
0.198	-0.01	1.01	0.0009	-0.0010	0.0060	0.0009	-0.0010	0.0060
0.199	4.01	1.00	0.0008	-0.0013	0.0078	0.0008	-0.0013	0.0078
0.199	7.98	1.00	0.0007	-0.0019	0.0097	0.0007	-0.0019	0.0097
0.198	12.01	1.00	-0.0008	-0.0020	0.0120	-0.0008	-0.0020	0.0120
0.202	14.50	1.00	-0.0008	-0.0026	0.0119	-0.0008	-0.0026	0.0119
0.200	0.05	3.18	0.0010	-0.0011	0.0056	0.0010	-0.0011	0.0056
0.199	4.02	3.22	0.0001	-0.0011	0.0061	0.0001	-0.0011	0.0061
0.199	7.99	3.17	-0.0008	-0.0019	0.0109	-0.0008	-0.0019	0.0109
0.199	12.01	3.21	-0.0006	-0.0023	0.0080	-0.0006	-0.0023	0.0080
0.200	14.50	3.22	-0.0006	-0.0025	0.0092	-0.0006	-0.0025	0.0092

Table 26. Aerodynamic Characteristics for Standard Nozzle With $\theta = 30^\circ$,
 $\delta_{v,p,l} = 20^\circ$, $\delta_{v,p,r} = 20^\circ$, and $\beta = 5^\circ$

(a) Longitudinal characteristics

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
1.200	-0.01	0.77	0.0042	0.0234	-0.0092	0.0042	0.0234	-0.0092
1.200	-0.01	2.05	0.0019	0.0058	-0.0076	-0.0028	0.0174	-0.0030
1.200	-0.01	3.25	0.0083	-0.0071	-0.0136	-0.0008	0.0177	-0.0052
1.200	-0.01	3.98	0.0128	-0.0150	-0.0171	0.0010	0.0186	-0.0068
1.200	-0.02	5.54	0.0243	-0.0317	-0.0268	0.0081	0.0203	-0.0127
1.201	-0.03	7.31	0.0308	-0.0528	-0.0323	0.0096	0.0200	-0.0138
1.200	-0.02	7.99	0.0330	-0.0616	-0.0341	0.0098	0.0195	-0.0139
0.900	0.02	0.94	-0.0046	0.0113	-0.0003	-0.0046	0.0113	-0.0003
0.900	0.02	1.99	0.0153	-0.0094	-0.0176	0.0075	0.0102	-0.0098
0.900	0.02	3.19	0.0206	-0.0331	-0.0222	0.0048	0.0098	-0.0076
0.901	0.00	3.99	0.0320	-0.0488	-0.0318	0.0111	0.0111	-0.0135
0.900	-0.03	5.04	0.0414	-0.0702	-0.0400	0.0151	0.0118	-0.0171
0.900	-0.02	6.03	0.0509	-0.0909	-0.0466	0.0196	0.0121	-0.0192
0.900	-0.03	7.00	0.0576	-0.1114	-0.0528	0.0214	0.0119	-0.0212
0.901	0.02	0.96	-0.0044	0.0107	-0.0002	-0.0044	0.0107	-0.0002
0.900	4.01	0.96	0.0010	0.0121	-0.0042	0.0010	0.0121	-0.0042
0.898	7.99	0.95	0.0119	0.0154	-0.0103	0.0119	0.0154	-0.0103
0.902	10.62	0.94	0.0167	0.0180	-0.0134	0.0167	0.0180	-0.0134
0.900	-0.02	5.96	0.0507	-0.0892	-0.0459	0.0197	0.0123	-0.0189
0.900	4.01	5.97	0.0632	-0.0841	-0.0508	0.0252	0.0148	-0.0238
0.901	7.97	6.00	0.0806	-0.0768	-0.0579	0.0357	0.0198	-0.0309
0.901	10.58	6.03	0.0911	-0.0711	-0.0628	0.0414	0.0241	-0.0355
0.801	0.04	0.97	-0.0017	0.0104	-0.0029	-0.0017	0.0104	-0.0029
0.801	-0.01	2.05	0.0294	-0.0161	-0.0286	0.0188	0.0103	-0.0180
0.802	0.02	3.17	0.0316	-0.0451	-0.0303	0.0118	0.0086	-0.0120
0.801	-0.02	4.47	0.0492	-0.0772	-0.0455	0.0197	0.0112	-0.0197
0.797	-0.01	5.48	0.0613	-0.1040	-0.0540	0.0249	0.0123	-0.0223
0.601	-0.02	0.98	0.0116	0.0101	-0.0123	0.0116	0.0101	-0.0123
0.601	0.00	2.02	0.0542	-0.0346	-0.0490	0.0362	0.0106	-0.0309
0.600	0.01	3.23	0.0630	-0.0895	-0.0561	0.0269	0.0088	-0.0227
0.600	-0.03	3.98	0.0768	-0.1234	-0.0679	0.0299	0.0106	-0.0269
0.599	-0.02	4.78	0.0889	-0.1614	-0.0774	0.0326	0.0112	-0.0282
0.600	-0.03	5.49	0.0992	-0.1955	-0.0852	0.0349	0.0107	-0.0290
0.600	0.00	1.00	0.0109	0.0100	-0.0116	0.0109	0.0100	-0.0116
0.600	4.02	0.99	0.0154	0.0124	-0.0153	0.0154	0.0124	-0.0153
0.600	8.00	0.99	0.0328	0.0175	-0.0275	0.0328	0.0175	-0.0275
0.599	12.03	0.99	0.0442	0.0252	-0.0347	0.0442	0.0252	-0.0347
0.601	-0.02	4.81	0.0882	-0.1621	-0.0771	0.0319	0.0110	-0.0279
0.600	4.00	4.81	0.1062	-0.1552	-0.0807	0.0376	0.0141	-0.0313
0.600	8.00	4.81	0.1259	-0.1438	-0.0870	0.0458	0.0202	-0.0377
0.600	11.25	4.81	0.1468	-0.1318	-0.0940	0.0575	0.0273	-0.0446

Table 26. Continued

(a) Concluded

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
0.202	0.03	0.99	0.0064	0.0061	-0.0196	0.0064	0.0061	-0.0196
0.201	0.00	1.54	0.1001	-0.2177	-0.1111	0.0213	0.0107	-0.0253
0.199	0.00	2.04	0.2094	-0.4102	-0.2061	0.0393	0.0133	-0.0364
0.200	-0.03	2.63	0.3066	-0.6460	-0.2805	0.0584	0.0124	-0.0459
0.200	-0.02	3.18	0.3480	-0.8652	-0.3189	0.0296	0.0019	-0.0236
0.200	-0.02	3.99	0.4555	-1.1990	-0.3966	0.0322	0.0120	-0.0265
0.199	0.01	1.00	0.0066	0.0066	-0.0201	0.0066	0.0066	-0.0201
0.200	4.00	1.00	0.0152	0.0077	-0.0223	0.0152	0.0077	-0.0223
0.200	7.99	1.00	0.0333	0.0158	-0.0271	0.0333	0.0158	-0.0271
0.199	12.00	1.00	0.0351	0.0176	-0.0364	0.0351	0.0176	-0.0364
0.200	14.52	1.00	0.0568	0.0275	-0.0400	0.0568	0.0275	-0.0400
0.201	-0.01	3.21	0.3591	-0.8663	-0.3153	0.0402	0.0025	-0.0199
0.200	4.01	3.21	0.4233	-0.8514	-0.3182	0.0417	-0.0011	-0.0207
0.201	8.01	3.21	0.4817	-0.8110	-0.3221	0.0437	0.0067	-0.0260
0.201	11.98	3.21	0.5619	-0.7644	-0.3299	0.0699	0.0185	-0.0348
0.198	14.52	3.21	0.6170	-0.7655	-0.3462	0.0717	0.0226	-0.0403

Table 26. Continued

(b) Lateral characteristics

MACH	ALPHA	NPR	CR	CN	CY	CRA	CNA	CYA
1.200	-0.01	0.77	0.0006	0.0009	-0.0017	0.0006	0.0009	-0.0017
1.200	-0.01	2.05	0.0003	0.0001	0.0004	0.0003	0.0001	0.0004
1.200	-0.01	3.25	0.0003	-0.0001	0.0014	0.0003	-0.0001	0.0014
1.200	-0.01	3.98	0.0003	-0.0001	0.0016	0.0003	-0.0001	0.0016
1.200	-0.02	5.54	0.0002	-0.0001	0.0028	0.0002	-0.0001	0.0028
1.201	-0.03	7.31	0.0003	0.0000	0.0030	0.0003	0.0000	0.0030
1.200	-0.02	7.99	0.0003	0.0000	0.0030	0.0003	0.0000	0.0030
0.900	0.02	0.94	0.0002	-0.0003	0.0019	0.0002	-0.0003	0.0019
0.900	0.02	1.99	0.0003	-0.0002	0.0018	0.0003	-0.0002	0.0018
0.900	0.02	3.19	0.0002	-0.0004	0.0035	0.0002	-0.0004	0.0035
0.901	0.00	3.99	0.0003	-0.0002	0.0041	0.0003	-0.0002	0.0041
0.900	-0.03	5.04	0.0003	-0.0001	0.0046	0.0003	-0.0001	0.0046
0.900	-0.02	6.03	0.0004	0.0000	0.0044	0.0004	0.0000	0.0044
0.900	-0.03	7.00	0.0004	0.0001	0.0045	0.0004	0.0001	0.0045
0.901	0.02	0.96	0.0003	-0.0002	0.0017	0.0003	-0.0002	0.0017
0.900	4.01	0.96	-0.0003	0.0000	-0.0011	-0.0003	0.0000	-0.0011
0.898	7.99	0.95	-0.0006	0.0003	-0.0038	-0.0006	0.0003	-0.0038
0.902	10.62	0.94	-0.0008	0.0007	-0.0056	-0.0008	0.0007	-0.0056
0.900	-0.02	5.96	0.0004	0.0000	0.0043	0.0004	0.0000	0.0043
0.900	4.01	5.97	-0.0001	0.0004	0.0015	-0.0001	0.0004	0.0015
0.901	7.97	6.00	-0.0005	0.0009	-0.0015	-0.0005	0.0009	-0.0015
0.901	10.58	6.03	-0.0007	0.0015	-0.0044	-0.0007	0.0015	-0.0044
0.801	0.04	0.97	0.0002	-0.0001	0.0003	0.0002	-0.0001	0.0003
0.801	-0.01	2.05	0.0002	0.0002	0.0012	0.0002	0.0002	0.0012
0.802	0.02	3.17	0.0002	-0.0002	0.0024	0.0002	-0.0002	0.0024
0.801	-0.02	4.47	0.0002	0.0000	0.0034	0.0002	0.0000	0.0034
0.797	-0.01	5.48	0.0003	0.0001	0.0034	0.0003	0.0001	0.0034
0.601	-0.02	0.98	0.0007	0.0014	-0.0051	0.0007	0.0014	-0.0051
0.601	0.00	2.02	0.0001	-0.0001	0.0026	0.0001	-0.0001	0.0026
0.600	0.01	3.23	0.0003	0.0005	0.0013	0.0003	0.0005	0.0013
0.600	-0.03	3.98	0.0002	0.0002	0.0028	0.0002	0.0002	0.0028
0.599	-0.02	4.78	0.0001	0.0001	0.0046	0.0001	0.0001	0.0046
0.600	-0.03	5.49	0.0002	0.0001	0.0052	0.0002	0.0001	0.0052
0.600	0.00	1.00	0.0007	0.0014	-0.0057	0.0007	0.0014	-0.0057
0.600	4.02	0.99	0.0000	0.0014	-0.0053	0.0000	0.0014	-0.0053
0.600	8.00	0.99	-0.0010	-0.0007	0.0014	-0.0010	-0.0007	0.0014
0.599	12.03	0.99	-0.0012	-0.0006	-0.0003	-0.0012	-0.0006	-0.0003
0.601	-0.02	4.81	0.0002	0.0002	0.0050	0.0002	0.0002	0.0050
0.600	4.00	4.81	-0.0004	0.0002	0.0053	-0.0004	0.0002	0.0053
0.600	8.00	4.81	-0.0009	0.0000	0.0038	-0.0009	0.0000	0.0038
0.600	11.25	4.81	-0.0011	0.0000	0.0036	-0.0011	0.0000	0.0036

Table 26. Concluded

(b) Concluded

MACH	ALPHA	NPR	CR	CN	CY	CRA	CNA	CYA
0.202	0.03	0.99	0.0003	-0.0001	-0.0076	0.0003	-0.0001	-0.0076
0.201	0.00	1.54	0.0004	-0.0005	0.0001	0.0004	-0.0005	0.0001
0.199	0.00	2.04	0.0006	-0.0003	0.0032	0.0006	-0.0003	0.0032
0.200	-0.03	2.63	0.0010	0.0005	0.0012	0.0010	0.0005	0.0012
0.200	-0.02	3.18	0.0011	0.0017	0.0016	0.0011	0.0017	0.0016
0.200	-0.02	3.99	0.0010	0.0017	0.0182	0.0010	0.0017	0.0182
0.199	0.01	1.00	0.0002	0.0000	-0.0010	0.0002	0.0000	-0.0010
0.200	4.00	1.00	0.0001	-0.0013	0.0020	0.0001	-0.0013	0.0020
0.200	7.99	1.00	-0.0002	-0.0034	0.0066	-0.0002	-0.0034	0.0066
0.199	12.00	1.00	-0.0014	-0.0044	0.0102	-0.0014	-0.0044	0.0102
0.200	14.52	1.00	-0.0014	-0.0050	0.0088	-0.0014	-0.0050	0.0088
0.201	-0.01	3.21	0.0009	0.0015	0.0072	0.0009	0.0015	0.0072
0.200	4.01	3.21	0.0009	0.0002	0.0058	0.0009	0.0002	0.0058
0.201	8.01	3.21	-0.0004	-0.0013	0.0195	-0.0004	-0.0013	0.0195
0.201	11.98	3.21	-0.0004	-0.0025	0.0100	-0.0004	-0.0025	0.0100
0.198	14.52	3.21	-0.0004	-0.0031	0.0116	-0.0004	-0.0031	0.0116

Table 27. Aerodynamic Characteristics for Standard Nozzle With $\theta = 30^\circ$,
 $\delta_{v,p,l} = -20^\circ$, $\delta_{v,p,r} = 20^\circ$, and $\beta = 5^\circ$

(a) Longitudinal characteristics

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
1.199	0.02	0.78	-0.0148	0.0234	0.0087	-0.0148	0.0234	0.0087
1.199	0.02	2.04	-0.0129	0.0073	0.0067	-0.0129	0.0191	0.0067
1.200	0.02	3.19	-0.0131	-0.0040	0.0064	-0.0131	0.0204	0.0064
1.199	0.03	3.97	-0.0139	-0.0126	0.0080	-0.0139	0.0211	0.0080
1.201	0.04	5.51	-0.0097	-0.0281	0.0041	-0.0097	0.0235	0.0041
1.202	0.05	7.30	-0.0100	-0.0515	0.0040	-0.0101	0.0211	0.0040
1.200	0.06	7.98	-0.0099	-0.0608	0.0040	-0.0100	0.0201	0.0040
0.902	0.00	0.95	-0.0089	0.0120	0.0026	-0.0089	0.0120	0.0026
0.901	0.00	1.95	-0.0104	-0.0075	0.0039	-0.0104	0.0117	0.0039
0.902	0.01	3.19	-0.0062	-0.0318	0.0013	-0.0062	0.0115	0.0013
0.901	0.05	4.02	-0.0059	-0.0486	0.0011	-0.0060	0.0122	0.0011
0.900	0.05	5.03	-0.0067	-0.0695	0.0012	-0.0068	0.0124	0.0012
0.900	0.07	5.99	-0.0060	-0.0897	0.0012	-0.0061	0.0124	0.0012
0.899	0.07	6.99	-0.0053	-0.1110	0.0011	-0.0054	0.0123	0.0011
0.899	-0.02	0.96	-0.0076	0.0114	0.0026	-0.0076	0.0114	0.0026
0.900	4.03	0.96	-0.0023	0.0120	-0.0015	-0.0023	0.0120	-0.0015
0.900	7.98	0.95	0.0051	0.0145	-0.0061	0.0051	0.0145	-0.0061
0.901	11.57	0.94	0.0134	0.0177	-0.0096	0.0134	0.0177	-0.0096
0.900	0.04	5.96	-0.0055	-0.0888	0.0013	-0.0056	0.0126	0.0013
0.901	4.06	6.02	0.0066	-0.0899	-0.0025	-0.0006	0.0123	-0.0025
0.900	8.02	6.02	0.0213	-0.0872	-0.0070	0.0070	0.0146	-0.0070
0.901	12.03	6.02	0.0379	-0.0821	-0.0123	0.0165	0.0182	-0.0123
0.799	0.04	0.98	-0.0075	0.0113	0.0024	-0.0075	0.0113	0.0024
0.799	0.00	1.96	-0.0093	-0.0130	0.0042	-0.0093	0.0116	0.0042
0.801	0.02	3.21	-0.0061	-0.0447	0.0011	-0.0062	0.0106	0.0011
0.800	0.06	4.54	-0.0050	-0.0786	0.0013	-0.0051	0.0120	0.0013
0.800	0.07	5.48	-0.0054	-0.1039	0.0011	-0.0056	0.0119	0.0011
0.601	0.02	0.99	-0.0166	0.0112	0.0094	-0.0166	0.0112	0.0094
0.599	0.01	1.96	-0.0042	-0.0319	-0.0018	-0.0042	0.0116	-0.0018
0.600	0.03	3.21	-0.0098	-0.0887	0.0025	-0.0098	0.0101	0.0025
0.601	0.06	3.99	-0.0063	-0.1239	0.0001	-0.0064	0.0111	0.0001
0.601	0.06	4.81	-0.0038	-0.1619	-0.0002	-0.0040	0.0115	-0.0002
0.601	0.05	5.50	-0.0047	-0.1947	0.0000	-0.0049	0.0110	0.0000
0.599	-0.02	1.00	-0.0168	0.0111	0.0098	-0.0168	0.0111	0.0098
0.600	4.03	1.00	-0.0130	0.0101	0.0074	-0.0130	0.0101	0.0074
0.600	8.01	1.01	0.0038	0.0119	-0.0044	0.0038	0.0119	-0.0044
0.600	12.01	1.01	0.0124	0.0150	-0.0090	0.0124	0.0150	-0.0090
0.600	0.06	4.80	-0.0039	-0.1623	0.0002	-0.0041	0.0111	0.0002
0.602	4.06	4.80	0.0120	-0.1612	-0.0028	-0.0002	0.0110	-0.0028
0.601	8.02	4.80	0.0316	-0.1580	-0.0066	0.0075	0.0130	-0.0066
0.599	12.02	4.79	0.0559	-0.1532	-0.0139	0.0198	0.0167	-0.0139

Table 27. Continued

(a) Concluded

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
0.202	0.03	1.00	-0.0139	0.0098	-0.0025	-0.0139	0.0098	-0.0025
0.201	0.01	1.52	-0.0085	-0.2171	-0.0061	-0.0085	0.0080	-0.0061
0.201	0.04	2.02	-0.0066	-0.3953	-0.0078	-0.0069	0.0158	-0.0078
0.199	0.04	2.65	-0.0087	-0.6610	-0.0061	-0.0091	0.0240	-0.0061
0.199	0.05	3.21	0.0014	-0.8945	-0.0023	0.0006	0.0049	-0.0023
0.200	0.05	3.98	0.0003	-1.2040	-0.0015	-0.0008	0.0124	-0.0015
0.201	-0.01	1.00	-0.0166	0.0100	0.0004	-0.0166	0.0100	0.0004
0.201	4.01	1.00	-0.0119	0.0060	-0.0007	-0.0119	0.0060	-0.0007
0.201	7.98	1.00	0.0107	0.0057	-0.0053	0.0107	0.0057	-0.0053
0.200	12.02	1.00	0.0086	0.0081	-0.0132	0.0086	0.0081	-0.0132
0.200	14.51	1.00	0.0344	0.0161	-0.0150	0.0344	0.0161	-0.0150
0.200	0.06	3.21	0.0065	-0.8858	0.0001	0.0056	0.0026	0.0001
0.201	4.05	3.21	0.0693	-0.8776	-0.0021	0.0071	0.0014	-0.0021
0.200	8.05	3.21	0.1358	-0.8783	-0.0048	0.0113	0.0023	-0.0048
0.200	12.03	3.21	0.2182	-0.8612	-0.0123	0.0333	0.0067	-0.0123
0.200	14.53	3.21	0.2608	-0.8476	-0.0166	0.0380	0.0118	-0.0166

Table 27. Continued

(b) Lateral characteristics

MACH	ALPHA	NPR	CR	CN	CY	CRA	CNA	CYA
1.199	0.02	0.78	-0.0005	-0.0019	0.0074	-0.0005	-0.0019	0.0074
1.199	0.02	2.04	-0.0005	-0.0021	0.0074	-0.0002	-0.0010	0.0037
1.200	0.02	3.19	-0.0009	-0.0035	0.0126	-0.0004	-0.0015	0.0057
1.199	0.03	3.97	-0.0012	-0.0047	0.0167	-0.0005	-0.0020	0.0076
1.201	0.04	5.51	-0.0018	-0.0065	0.0236	-0.0008	-0.0029	0.0116
1.202	0.05	7.30	-0.0020	-0.0072	0.0263	-0.0006	-0.0026	0.0108
1.200	0.06	7.98	-0.0021	-0.0076	0.0276	-0.0005	-0.0025	0.0107
0.902	0.00	0.95	0.0002	-0.0006	0.0032	0.0002	-0.0006	0.0032
0.901	0.00	1.95	-0.0007	-0.0039	0.0144	-0.0002	-0.0021	0.0082
0.902	0.01	3.19	-0.0011	-0.0054	0.0208	-0.0001	-0.0017	0.0085
0.901	0.05	4.02	-0.0015	-0.0072	0.0271	-0.0002	-0.0023	0.0106
0.900	0.05	5.03	-0.0020	-0.0087	0.0314	-0.0003	-0.0029	0.0117
0.900	0.07	5.99	-0.0024	-0.0100	0.0364	-0.0004	-0.0031	0.0132
0.899	0.07	6.99	-0.0028	-0.0113	0.0403	-0.0003	-0.0034	0.0136
0.899	-0.02	0.96	0.0002	-0.0006	0.0032	0.0002	-0.0006	0.0032
0.900	4.03	0.96	-0.0003	-0.0006	0.0007	-0.0003	-0.0006	0.0007
0.900	7.98	0.95	-0.0006	-0.0006	-0.0007	-0.0006	-0.0006	-0.0007
0.901	11.57	0.94	-0.0009	0.0001	-0.0048	-0.0009	0.0001	-0.0048
0.900	0.04	5.96	-0.0023	-0.0099	0.0355	-0.0003	-0.0030	0.0125
0.901	4.06	6.02	-0.0029	-0.0100	0.0340	-0.0008	-0.0031	0.0109
0.900	8.02	6.02	-0.0034	-0.0101	0.0330	-0.0014	-0.0032	0.0098
0.901	12.03	6.02	-0.0037	-0.0092	0.0272	-0.0016	-0.0023	0.0040
0.799	0.04	0.98	0.0001	-0.0008	0.0024	0.0001	-0.0008	0.0024
0.799	0.00	1.96	-0.0012	-0.0051	0.0189	-0.0005	-0.0028	0.0110
0.801	0.02	3.21	-0.0015	-0.0068	0.0252	-0.0003	-0.0021	0.0095
0.800	0.06	4.54	-0.0024	-0.0098	0.0356	-0.0006	-0.0030	0.0130
0.800	0.07	5.48	-0.0028	-0.0114	0.0403	-0.0004	-0.0034	0.0134
0.601	0.02	0.99	-0.0005	-0.0018	0.0063	-0.0005	-0.0018	0.0063
0.599	0.01	1.96	-0.0023	-0.0086	0.0326	-0.0012	-0.0045	0.0186
0.600	0.03	3.21	-0.0030	-0.0115	0.0408	-0.0007	-0.0032	0.0127
0.601	0.06	3.99	-0.0038	-0.0145	0.0505	-0.0009	-0.0037	0.0138
0.601	0.06	4.81	-0.0044	-0.0167	0.0593	-0.0009	-0.0041	0.0170
0.601	0.05	5.50	-0.0050	-0.0185	0.0638	-0.0009	-0.0042	0.0160
0.599	-0.02	1.00	-0.0005	-0.0017	0.0063	-0.0005	-0.0017	0.0063
0.600	4.03	1.00	-0.0010	-0.0022	0.0068	-0.0010	-0.0022	0.0068
0.600	8.01	1.01	-0.0018	-0.0049	0.0165	-0.0018	-0.0049	0.0165
0.600	12.01	1.01	-0.0021	-0.0049	0.0156	-0.0021	-0.0049	0.0156
0.600	0.06	4.80	-0.0043	-0.0168	0.0579	-0.0008	-0.0041	0.0155
0.602	4.06	4.80	-0.0050	-0.0175	0.0605	-0.0014	-0.0049	0.0183
0.601	8.02	4.80	-0.0055	-0.0186	0.0621	-0.0019	-0.0060	0.0199
0.599	12.02	4.79	-0.0060	-0.0190	0.0627	-0.0024	-0.0064	0.0202

Table 27. Concluded

(b) Concluded

MACH	ALPHA	NPR	CR	CN	CY	CRA	CNA	CYA
0.202	0.03	1.00	-0.0006	-0.0029	0.0023	-0.0006	-0.0029	0.0023
0.201	0.01	1.52	-0.0063	-0.0250	0.0729	0.0009	-0.0014	-0.0071
0.201	0.04	2.02	-0.0128	-0.0452	0.1587	-0.0018	-0.0067	0.0280
0.199	0.04	2.65	-0.0193	-0.0671	0.2427	-0.0032	-0.0086	0.0441
0.199	0.05	3.21	-0.0224	-0.0776	0.2769	-0.0021	-0.0021	0.0212
0.200	0.05	3.98	-0.0277	-0.0985	0.3452	-0.0017	-0.0009	0.0144
0.201	-0.01	1.00	-0.0005	-0.0028	0.0167	-0.0005	-0.0028	0.0167
0.201	4.01	1.00	-0.0013	-0.0049	0.0216	-0.0013	-0.0049	0.0216
0.201	7.98	1.00	-0.0016	-0.0070	0.0239	-0.0016	-0.0070	0.0239
0.200	12.02	1.00	-0.0023	-0.0090	0.0281	-0.0023	-0.0090	0.0281
0.200	14.51	1.00	-0.0022	-0.0099	0.0290	-0.0022	-0.0099	0.0290
0.200	0.06	3.21	-0.0209	-0.0774	0.2743	-0.0008	-0.0029	0.0217
0.201	4.05	3.21	-0.0220	-0.0787	0.2751	-0.0021	-0.0048	0.0246
0.200	8.05	3.21	-0.0225	-0.0818	0.2805	-0.0024	-0.0072	0.0276
0.200	12.03	3.21	-0.0226	-0.0836	0.2889	-0.0025	-0.0091	0.0366
0.200	14.53	3.21	-0.0223	-0.0845	0.2845	-0.0022	-0.0100	0.0321

Table 28. Aerodynamic Characteristics for Standard Nozzle With $\theta = 30^\circ$,
 $\delta_{v,p,l} = 0^\circ$, $\delta_{v,p,r} = 20^\circ$, and $\beta = 5^\circ$

(a) Longitudinal characteristics

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
1.200	0.02	0.81	-0.0060	0.0212	0.0010	-0.0060	0.0212	0.0010
1.199	0.05	1.96	-0.0065	0.0062	0.0008	-0.0087	0.0184	0.0030
1.200	0.04	3.16	-0.0020	-0.0069	-0.0033	-0.0069	0.0194	0.0007
1.200	0.04	4.01	0.0000	-0.0174	-0.0052	-0.0064	0.0194	0.0000
1.201	0.02	5.52	0.0069	-0.0349	-0.0111	-0.0020	0.0204	-0.0040
1.200	0.03	7.34	0.0106	-0.0589	-0.0132	-0.0010	0.0183	-0.0046
1.200	0.03	7.97	0.0107	-0.0674	-0.0138	-0.0019	0.0175	-0.0046
0.901	0.02	0.99	-0.0086	0.0111	0.0041	-0.0086	0.0111	0.0041
0.902	0.01	1.99	0.0002	-0.0135	-0.0051	-0.0039	0.0088	-0.0011
0.904	0.02	3.20	0.0055	-0.0383	-0.0089	-0.0032	0.0091	-0.0016
0.902	0.02	4.03	0.0106	-0.0560	-0.0133	-0.0007	0.0096	-0.0040
0.897	0.03	4.96	0.0159	-0.0775	-0.0171	0.0015	0.0094	-0.0053
0.901	0.03	6.03	0.0186	-0.1004	-0.0201	0.0015	0.0087	-0.0068
0.902	0.04	7.00	0.0235	-0.1214	-0.0230	0.0037	0.0082	-0.0082
0.902	0.02	1.01	-0.0089	0.0104	0.0042	-0.0089	0.0104	0.0042
0.901	4.05	1.00	-0.0053	0.0115	0.0008	-0.0053	0.0115	0.0008
0.898	8.01	1.00	0.0032	0.0135	-0.0031	0.0032	0.0135	-0.0031
0.903	11.48	1.00	0.0101	0.0163	-0.0069	0.0101	0.0163	-0.0069
0.903	0.05	6.03	0.0183	-0.0994	-0.0195	0.0012	0.0091	-0.0063
0.903	4.06	6.03	0.0300	-0.0970	-0.0222	0.0053	0.0100	-0.0089
0.901	8.02	6.03	0.0464	-0.0932	-0.0272	0.0142	0.0125	-0.0138
0.900	12.05	6.03	0.0634	-0.0862	-0.0322	0.0239	0.0170	-0.0189
0.799	0.07	1.01	-0.0067	0.0096	0.0021	-0.0067	0.0096	0.0021
0.801	0.02	1.97	0.0092	-0.0193	-0.0111	0.0043	0.0083	-0.0061
0.800	0.03	3.22	0.0129	-0.0529	-0.0148	0.0016	0.0081	-0.0054
0.801	0.03	4.54	0.0213	-0.0886	-0.0214	0.0048	0.0085	-0.0080
0.799	0.03	5.47	0.0260	-0.1151	-0.0250	0.0061	0.0084	-0.0092
0.599	0.03	1.00	-0.0039	0.0087	-0.0006	-0.0039	0.0087	-0.0006
0.602	0.03	1.98	0.0234	-0.0396	-0.0229	0.0145	0.0094	-0.0139
0.603	0.03	3.22	0.0264	-0.0990	-0.0256	0.0066	0.0084	-0.0091
0.602	0.04	3.98	0.0327	-0.1362	-0.0322	0.0075	0.0088	-0.0115
0.602	0.05	4.79	0.0398	-0.1757	-0.0370	0.0088	0.0091	-0.0114
0.599	0.05	5.49	0.0454	-0.2123	-0.0412	0.0097	0.0082	-0.0129
0.600	0.04	1.01	-0.0048	0.0087	0.0000	-0.0048	0.0087	0.0000
0.600	4.06	1.01	0.0003	0.0089	-0.0034	0.0003	0.0089	-0.0034
0.601	8.02	1.01	0.0156	0.0125	-0.0143	0.0156	0.0125	-0.0143
0.599	12.06	1.01	0.0260	0.0163	-0.0202	0.0260	0.0163	-0.0202
0.600	0.06	4.83	0.0402	-0.1787	-0.0372	0.0087	0.0092	-0.0113
0.601	4.07	4.83	0.0605	-0.1747	-0.0401	0.0159	0.0104	-0.0142
0.599	8.03	4.83	0.0803	-0.1685	-0.0448	0.0229	0.0136	-0.0188
0.600	12.06	4.83	0.1061	-0.1583	-0.0527	0.0360	0.0193	-0.0268

Table 28. Continued

(a) Concluded

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
0.202	0.06	0.99	0.0018	0.0039	-0.0075	0.0018	0.0039	-0.0075
0.198	0.06	1.57	0.0591	-0.2797	-0.0678	0.0204	-0.0007	-0.0195
0.199	0.07	2.05	0.1029	-0.4767	-0.1084	0.0138	0.0045	-0.0201
0.199	0.06	2.62	0.1684	-0.7151	-0.1501	0.0253	0.0135	-0.0280
0.200	0.06	3.19	0.1823	-0.9543	-0.1622	0.0043	0.0080	-0.0136
0.200	0.07	3.98	0.2246	-1.2980	-0.2025	-0.0040	0.0123	-0.0152
0.199	0.04	1.00	0.0015	0.0018	-0.0063	0.0015	0.0018	-0.0063
0.200	4.05	1.00	0.0010	0.0081	-0.0095	0.0010	0.0081	-0.0095
0.202	8.03	1.00	0.0015	0.0072	-0.0155	0.0015	0.0072	-0.0155
0.203	12.05	1.00	0.0264	0.0111	-0.0251	0.0264	0.0111	-0.0251
0.201	14.54	1.00	0.0228	0.0175	-0.0297	0.0228	0.0175	-0.0297
0.200	0.05	3.21	0.1837	-0.9647	-0.1619	0.0041	0.0097	-0.0119
0.203	4.06	3.22	0.2442	-0.9272	-0.1596	0.0025	0.0109	-0.0130
0.201	8.03	3.22	0.3253	-0.9161	-0.1675	0.0158	0.0130	-0.0192
0.199	12.07	3.22	0.4091	-0.9105	-0.1790	0.0255	0.0174	-0.0270
0.197	14.56	3.22	0.4558	-0.9019	-0.1874	0.0264	0.0211	-0.0333

Table 28. Continued

(b) Lateral characteristics

MACH	ALPHA	NPR	CR	CN	CY	CRA	CNA	CYA
1.200	0.02	0.81	0.0000	0.0001	0.0006	0.0000	0.0001	0.0006
1.199	0.05	1.96	-0.0002	-0.0006	0.0028	0.0000	0.0000	0.0008
1.200	0.04	3.16	-0.0003	-0.0012	0.0053	0.0000	-0.0002	0.0016
1.200	0.04	4.01	-0.0004	-0.0016	0.0065	0.0000	-0.0003	0.0016
1.201	0.02	5.52	-0.0007	-0.0026	0.0112	-0.0002	-0.0009	0.0047
1.200	0.03	7.34	-0.0009	-0.0033	0.0141	-0.0002	-0.0011	0.0055
1.200	0.03	7.97	-0.0009	-0.0035	0.0147	-0.0001	-0.0011	0.0054
0.901	0.02	0.99	0.0002	0.0002	0.0005	0.0002	0.0002	0.0005
0.902	0.01	1.99	-0.0002	-0.0020	0.0078	0.0001	-0.0010	0.0041
0.904	0.02	3.20	-0.0004	-0.0026	0.0107	0.0001	-0.0008	0.0040
0.902	0.02	4.03	-0.0006	-0.0033	0.0139	0.0000	-0.0010	0.0053
0.897	0.03	4.96	-0.0009	-0.0040	0.0166	-0.0001	-0.0012	0.0060
0.901	0.03	6.03	-0.0010	-0.0047	0.0195	0.0000	-0.0014	0.0069
0.902	0.04	7.00	-0.0012	-0.0053	0.0215	0.0000	-0.0016	0.0070
0.902	0.02	1.01	0.0003	0.0003	0.0000	0.0003	0.0003	0.0000
0.901	4.05	1.00	-0.0002	0.0005	-0.0023	-0.0002	0.0005	-0.0023
0.898	8.01	1.00	-0.0006	0.0009	-0.0046	-0.0006	0.0009	-0.0046
0.903	11.48	1.00	-0.0007	0.0020	-0.0095	-0.0007	0.0020	-0.0095
0.903	0.05	6.03	-0.0010	-0.0047	0.0192	0.0000	-0.0014	0.0066
0.903	4.06	6.03	-0.0015	-0.0045	0.0169	-0.0005	-0.0012	0.0044
0.901	8.02	6.03	-0.0019	-0.0041	0.0141	-0.0009	-0.0009	0.0014
0.900	12.05	6.03	-0.0022	-0.0032	0.0092	-0.0012	0.0001	-0.0034
0.799	0.07	1.01	0.0002	0.0000	0.0000	0.0002	0.0000	0.0000
0.801	0.02	1.97	-0.0004	-0.0024	0.0088	0.0000	-0.0012	0.0042
0.800	0.03	3.22	-0.0007	-0.0032	0.0125	0.0000	-0.0009	0.0039
0.801	0.03	4.54	-0.0010	-0.0046	0.0185	-0.0001	-0.0014	0.0063
0.799	0.03	5.47	-0.0013	-0.0055	0.0213	-0.0001	-0.0016	0.0066
0.599	0.03	1.00	0.0001	-0.0001	0.0002	0.0001	-0.0001	0.0002
0.602	0.03	1.98	-0.0012	-0.0048	0.0185	-0.0005	-0.0025	0.0103
0.603	0.03	3.22	-0.0013	-0.0056	0.0217	-0.0002	-0.0016	0.0066
0.602	0.04	3.98	-0.0018	-0.0071	0.0280	-0.0003	-0.0020	0.0089
0.602	0.05	4.79	-0.0022	-0.0083	0.0327	-0.0004	-0.0024	0.0099
0.599	0.05	5.49	-0.0024	-0.0093	0.0369	-0.0003	-0.0026	0.0108
0.600	0.04	1.01	0.0002	-0.0002	0.0001	0.0002	-0.0002	0.0001
0.600	4.06	1.01	-0.0004	-0.0006	0.0009	-0.0004	-0.0006	0.0009
0.601	8.02	1.01	-0.0012	-0.0028	0.0095	-0.0012	-0.0028	0.0095
0.599	12.06	1.01	-0.0017	-0.0026	0.0080	-0.0017	-0.0026	0.0080
0.600	0.06	4.83	-0.0022	-0.0085	0.0335	-0.0004	-0.0024	0.0104
0.601	4.07	4.83	-0.0028	-0.0088	0.0343	-0.0010	-0.0028	0.0112
0.599	8.03	4.83	-0.0033	-0.0095	0.0353	-0.0015	-0.0035	0.0122
0.600	12.06	4.83	-0.0038	-0.0095	0.0356	-0.0020	-0.0035	0.0125

Table 28. Concluded

(b) Concluded

MACH	ALPHA	NPR	CR	CN	CY	CRA	CNA	CYA
0.202	0.06	0.99	0.0006	-0.0015	0.0008	0.0006	-0.0015	0.0008
0.198	0.06	1.57	-0.0044	-0.0162	0.0430	0.0003	-0.0041	0.0020
0.199	0.07	2.05	-0.0076	-0.0257	0.0869	-0.0012	-0.0036	0.0059
0.199	0.06	2.62	-0.0092	-0.0341	0.1257	-0.0008	-0.0051	0.0213
0.200	0.06	3.19	-0.0113	-0.0378	0.1468	-0.0009	-0.0020	0.0112
0.200	0.07	3.98	-0.0142	-0.0481	0.1818	-0.0010	-0.0022	0.0085
0.199	0.04	1.00	0.0005	-0.0021	0.0012	0.0005	-0.0021	0.0012
0.200	4.05	1.00	-0.0003	-0.0027	0.0047	-0.0003	-0.0027	0.0047
0.202	8.03	1.00	-0.0013	-0.0039	0.0074	-0.0013	-0.0039	0.0074
0.203	12.05	1.00	-0.0012	-0.0044	0.0090	-0.0012	-0.0044	0.0090
0.201	14.54	1.00	-0.0011	-0.0053	0.0107	-0.0011	-0.0053	0.0107
0.200	0.05	3.21	-0.0113	-0.0386	0.1464	-0.0008	-0.0024	0.0091
0.203	4.06	3.22	-0.0111	-0.0386	0.1438	-0.0008	-0.0032	0.0097
0.201	8.03	3.22	-0.0114	-0.0403	0.1535	-0.0010	-0.0045	0.0178
0.199	12.07	3.22	-0.0129	-0.0416	0.1505	-0.0023	-0.0050	0.0114
0.197	14.56	3.22	-0.0135	-0.0428	0.1645	-0.0027	-0.0057	0.0235

Table 29. Longitudinal Aerodynamic Characteristics for Standard Nozzle With $\theta = 45^\circ$,
 $\delta_{v,p,l} = 0^\circ$, $\delta_{v,p,r} = 0^\circ$, and $\beta = 0^\circ$

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
1.201	-0.02	0.85	-0.0115	0.0221	0.0059	-0.0115	0.0221	0.0059
1.201	-0.01	0.85	-0.0117	0.0223	0.0059	-0.0117	0.0223	0.0059
1.200	0.01	1.99	-0.0126	0.0051	0.0062	-0.0126	0.0191	0.0062
1.199	0.01	3.17	-0.0126	-0.0087	0.0060	-0.0126	0.0202	0.0060
1.199	0.01	4.03	-0.0134	-0.0199	0.0064	-0.0134	0.0201	0.0064
1.199	0.02	5.54	-0.0140	-0.0413	0.0070	-0.0140	0.0179	0.0070
1.200	0.02	7.30	-0.0132	-0.0658	0.0067	-0.0133	0.0157	0.0067
1.199	0.01	7.95	-0.0129	-0.0749	0.0063	-0.0129	0.0151	0.0063
0.901	0.01	1.02	-0.0140	0.0109	0.0059	-0.0140	0.0109	0.0059
0.899	-0.01	1.95	-0.0091	-0.0148	0.0019	-0.0091	0.0090	0.0019
0.899	-0.01	3.20	-0.0085	-0.0432	0.0021	-0.0085	0.0089	0.0021
0.899	-0.01	4.00	-0.0088	-0.0619	0.0022	-0.0088	0.0085	0.0022
0.900	0.00	4.97	-0.0094	-0.0841	0.0024	-0.0094	0.0080	0.0024
0.899	0.01	5.99	-0.0101	-0.1079	0.0027	-0.0101	0.0075	0.0027
0.901	0.01	7.00	-0.0104	-0.1309	0.0026	-0.0104	0.0070	0.0026
0.900	0.02	1.04	-0.0121	0.0101	0.0056	-0.0121	0.0101	0.0056
0.900	4.02	1.03	-0.0139	0.0110	0.0076	-0.0139	0.0110	0.0076
0.900	7.98	1.03	-0.0057	0.0119	0.0011	-0.0057	0.0119	0.0011
0.897	12.11	1.03	0.0038	0.0141	-0.0046	0.0038	0.0141	-0.0046
0.902	-0.02	6.03	-0.0099	-0.1079	0.0025	-0.0098	0.0075	0.0025
0.901	4.00	6.02	0.0002	-0.1080	0.0013	-0.0079	0.0073	0.0013
0.898	8.01	6.00	0.0155	-0.1066	-0.0029	-0.0007	0.0083	-0.0029
0.900	11.84	6.02	0.0329	-0.1025	-0.0083	0.0091	0.0109	-0.0083
0.799	-0.03	1.06	-0.0102	0.0069	0.0031	-0.0102	0.0069	0.0031
0.801	0.01	1.98	-0.0089	-0.0236	0.0026	-0.0089	0.0073	0.0026
0.800	0.02	3.21	-0.0099	-0.0592	0.0030	-0.0099	0.0071	0.0030
0.800	0.03	4.47	-0.0108	-0.0960	0.0034	-0.0109	0.0063	0.0034
0.800	0.03	5.47	-0.0114	-0.1250	0.0038	-0.0115	0.0059	0.0038
0.600	0.01	1.03	-0.0112	0.0066	0.0040	-0.0112	0.0066	0.0040
0.602	0.02	1.96	-0.0120	-0.0481	0.0034	-0.0120	0.0059	0.0034
0.600	0.02	3.25	-0.0118	-0.1142	0.0044	-0.0119	0.0054	0.0044
0.601	0.03	3.98	-0.0124	-0.1507	0.0051	-0.0124	0.0058	0.0051
0.599	0.00	4.78	-0.0136	-0.1929	0.0055	-0.0136	0.0053	0.0055
0.600	0.01	5.51	-0.0145	-0.2297	0.0058	-0.0145	0.0050	0.0058
0.600	-0.02	1.04	-0.0113	0.0058	0.0043	-0.0113	0.0058	0.0043
0.601	4.03	1.03	-0.0126	0.0064	0.0065	-0.0126	0.0064	0.0065
0.597	8.00	1.03	-0.0082	0.0071	0.0032	-0.0082	0.0071	0.0032
0.601	12.02	1.03	-0.0002	0.0090	-0.0014	-0.0002	0.0090	-0.0014
0.603	0.03	4.83	-0.0135	-0.1927	0.0057	-0.0136	0.0056	0.0057
0.600	4.02	4.82	0.0003	-0.1945	0.0050	-0.0137	0.0048	0.0050
0.598	7.99	4.82	0.0219	-0.1937	0.0015	-0.0060	0.0052	0.0015
0.603	11.85	4.83	0.0433	-0.1867	-0.0041	0.0026	0.0075	-0.0041

Table 29. Concluded

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
0.202	-0.02	0.99	-0.0143	0.0059	-0.0002	-0.0143	0.0059	-0.0002
0.202	0.03	1.51	-0.0314	-0.2693	0.0040	-0.0315	0.0047	0.0040
0.198	0.03	2.06	-0.0341	-0.5386	0.0071	-0.0344	0.0022	0.0071
0.200	0.03	2.59	-0.0258	-0.7670	0.0120	-0.0263	0.0057	0.0120
0.201	0.03	3.18	-0.0277	-1.0330	0.0151	-0.0281	0.0073	0.0120
0.202	0.03	3.97	-0.0349	-1.3770	0.0186	-0.0356	0.0072	0.0186
0.200	-0.01	1.01	-0.0175	0.0050	0.0045	-0.0175	0.0050	0.0045
0.200	4.03	1.00	-0.0163	0.0029	0.0044	-0.0163	0.0029	0.0044
0.200	7.98	1.00	-0.0109	0.0018	0.0037	-0.0109	0.0018	0.0037
0.200	12.02	1.00	0.0051	0.0121	-0.0019	0.0051	0.0121	-0.0019
0.199	14.51	1.00	0.0051	0.0113	-0.0072	0.0051	0.0113	-0.0072
0.201	0.01	3.22	-0.0267	-1.0450	0.0164	-0.0269	0.0074	0.0164
0.201	4.02	3.22	0.0462	-1.0480	0.0159	-0.0277	0.0047	0.0159
0.199	8.00	3.21	0.1216	-1.0570	0.0109	-0.0279	0.0073	0.0109
0.199	12.02	3.22	0.2188	-1.0330	0.0050	-0.0035	0.0114	0.0050
0.200	14.50	3.22	0.2596	-1.0090	0.0023	-0.0053	0.0150	0.0023

Table 30. Longitudinal Aerodynamic Characteristics for Standard Nozzle With $\theta = 45^\circ$,
 $\delta_{v,p,l} = 20^\circ$, $\delta_{v,p,r} = 20^\circ$, and $\beta = 0^\circ$

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
1.201	0.00	0.77	-0.0028	0.0180	-0.0016	-0.0028	0.0180	-0.0016
1.196	0.00	2.02	-0.0014	0.0037	-0.0034	-0.0057	0.0154	0.0003
1.198	0.00	3.21	0.0038	-0.0085	-0.0084	-0.0039	0.0162	-0.0017
1.201	0.00	4.03	0.0082	-0.0176	-0.0117	-0.0016	0.0165	-0.0031
1.199	-0.01	5.49	0.0148	-0.0347	-0.0175	0.0012	0.0167	-0.0061
1.199	-0.01	7.31	0.0216	-0.0557	-0.0238	0.0033	0.0170	-0.0089
1.201	-0.02	8.01	0.0239	-0.0638	-0.0255	0.0039	0.0167	-0.0094
0.898	0.01	0.95	-0.0076	0.0106	0.0018	-0.0076	0.0106	0.0018
0.902	0.01	2.02	0.0086	-0.0101	-0.0133	0.0011	0.0104	-0.0069
0.900	-0.01	3.23	0.0130	-0.0344	-0.0170	-0.0008	0.0096	-0.0051
0.901	-0.01	3.99	0.0227	-0.0495	-0.0250	0.0054	0.0106	-0.0099
0.899	-0.02	5.00	0.0321	-0.0702	-0.0317	0.0102	0.0110	-0.0131
0.901	-0.01	6.01	0.0380	-0.0904	-0.0372	0.0115	0.0115	-0.0153
0.900	-0.01	7.02	0.0455	-0.1118	-0.0427	0.0143	0.0111	-0.0174
0.901	0.03	0.96	-0.0083	0.0104	0.0018	-0.0083	0.0104	0.0018
0.901	4.01	0.96	-0.0042	0.0110	-0.0008	-0.0042	0.0110	-0.0008
0.899	8.00	0.95	0.0034	0.0135	-0.0067	0.0034	0.0135	-0.0067
0.898	11.54	0.93	0.0155	0.0196	-0.0149	0.0155	0.0196	-0.0149
0.899	-0.02	6.02	0.0380	-0.0912	-0.0373	0.0114	0.0112	-0.0153
0.901	4.01	6.02	0.0498	-0.0863	-0.0417	0.0162	0.0137	-0.0198
0.901	7.99	6.01	0.0683	-0.0790	-0.0492	0.0278	0.0182	-0.0273
0.898	11.60	6.00	0.0855	-0.0703	-0.0569	0.0388	0.0245	-0.0349
0.800	0.02	0.97	-0.0067	0.0102	0.0000	-0.0067	0.0102	0.0000
0.801	0.01	2.01	0.0173	-0.0151	-0.0200	0.0079	0.0109	-0.0120
0.801	0.00	3.23	0.0211	-0.0468	-0.0236	0.0036	0.0089	-0.0086
0.798	-0.01	4.48	0.0370	-0.0784	-0.0364	0.0121	0.0111	-0.0150
0.799	-0.02	5.51	0.0459	-0.1052	-0.0433	0.0152	0.0111	-0.0176
0.603	0.03	0.97	-0.0015	0.0091	-0.0023	-0.0015	0.0091	-0.0023
0.601	0.01	2.00	0.0380	-0.0347	-0.0389	0.0216	0.0108	-0.0248
0.600	-0.02	3.21	0.0440	-0.0894	-0.0432	0.0132	0.0089	-0.0166
0.600	-0.02	3.99	0.0588	-0.1251	-0.0549	0.0200	0.0102	-0.0208
0.601	-0.02	4.81	0.0675	-0.1634	-0.0629	0.0204	0.0096	-0.0227
0.600	-0.02	5.51	0.0764	-0.1972	-0.0689	0.0219	0.0090	-0.0233
0.600	0.02	0.99	-0.0055	0.0092	-0.0016	-0.0055	0.0092	-0.0016
0.601	4.01	0.98	-0.0016	0.0102	-0.0042	-0.0016	0.0102	-0.0042
0.601	8.00	0.99	0.0132	0.0147	-0.0145	0.0132	0.0147	-0.0145
0.599	11.60	0.99	0.0281	0.0199	-0.0256	0.0281	0.0199	-0.0256
0.600	-0.02	4.80	0.0679	-0.1631	-0.0628	0.0207	0.0099	-0.0226
0.600	3.99	4.80	0.0834	-0.1572	-0.0643	0.0242	0.0122	-0.0241
0.600	7.99	4.81	0.1029	-0.1484	-0.0701	0.0319	0.0168	-0.0298
0.603	10.72	4.82	0.1179	-0.1388	-0.0754	0.0396	0.0219	-0.0353

Table 30. Concluded

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
0.203	0.03	0.99	-0.0102	0.0095	-0.0098	-0.0102	0.0095	-0.0098
0.201	0.00	1.53	0.0753	-0.2209	-0.0856	0.0059	0.0100	-0.0203
0.202	-0.02	2.04	0.1452	-0.3988	-0.1561	-0.0058	0.0167	-0.0268
0.203	-0.01	2.62	0.2245	-0.6231	-0.2165	0.0107	0.0167	-0.0317
0.203	-0.02	3.20	0.2639	-0.8521	-0.2492	-0.0064	0.0078	-0.0163
0.203	-0.01	4.00	0.3375	-1.1700	-0.3144	-0.0023	0.0147	-0.0162
0.202	0.01	1.00	-0.0132	0.0093	-0.0054	-0.0132	0.0093	-0.0054
0.203	4.02	1.00	0.0141	0.0079	-0.0119	0.0141	0.0079	-0.0119
0.203	8.00	1.00	0.0148	0.0102	-0.0194	0.0148	0.0102	-0.0194
0.203	12.02	1.00	0.0393	0.0225	-0.0275	0.0393	0.0225	-0.0275
0.202	14.51	1.00	0.0364	0.0221	-0.0293	0.0364	0.0221	-0.0293
0.200	0.00	3.21	0.2741	-0.8727	-0.2529	-0.0023	0.0065	-0.0149
0.201	4.02	3.21	0.3334	-0.8468	-0.2541	-0.0032	0.0087	-0.0167
0.201	7.99	3.21	0.4177	-0.8179	-0.2605	0.0225	0.0125	-0.0230
0.200	12.01	3.21	0.4760	-0.7843	-0.2684	0.0218	0.0198	-0.0300
0.201	14.51	3.21	0.5281	-0.7531	-0.2712	0.0421	0.0258	-0.0342

Table 31. Longitudinal Aerodynamic Characteristics for Standard Nozzle With $\theta = 45^\circ$,
 $\delta_{v,p,l} = -20^\circ$, $\delta_{v,p,r} = 20^\circ$, and $\beta = 0^\circ$

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
1.201	0.04	0.76	-0.0143	0.0207	0.0081	-0.0143	0.0207	0.0081
1.198	0.04	2.00	-0.0151	0.0060	0.0081	-0.0151	0.0173	0.0081
1.198	0.03	3.19	-0.0137	-0.0066	0.0077	-0.0138	0.0180	0.0077
1.199	0.04	4.02	-0.0136	-0.0156	0.0077	-0.0137	0.0189	0.0077
1.199	0.06	5.49	-0.0119	-0.0320	0.0063	-0.0119	0.0199	0.0063
1.200	0.07	7.29	-0.0123	-0.0544	0.0066	-0.0124	0.0187	0.0066
1.199	0.05	8.02	-0.0124	-0.0636	0.0066	-0.0125	0.0181	0.0066
0.901	0.02	0.95	-0.0120	0.0115	0.0050	-0.0120	0.0115	0.0050
0.899	0.02	1.98	-0.0156	-0.0087	0.0070	-0.0156	0.0110	0.0070
0.901	0.04	3.22	-0.0140	-0.0335	0.0063	-0.0140	0.0107	0.0063
0.901	0.06	3.98	-0.0144	-0.0492	0.0068	-0.0145	0.0111	0.0068
0.903	0.05	4.98	-0.0149	-0.0693	0.0070	-0.0150	0.0116	0.0070
0.902	0.06	6.00	-0.0147	-0.0908	0.0070	-0.0148	0.0115	0.0070
0.901	0.08	7.02	-0.0138	-0.1124	0.0069	-0.0140	0.0114	0.0069
0.902	-0.01	0.96	-0.0119	0.0111	0.0050	-0.0119	0.0111	0.0050
0.899	4.02	0.96	-0.0098	0.0107	0.0026	-0.0098	0.0107	0.0026
0.898	8.00	0.95	-0.0029	0.0123	-0.0012	-0.0029	0.0123	-0.0012
0.903	11.10	0.95	0.0044	0.0153	-0.0062	0.0044	0.0153	-0.0062
0.899	0.05	6.01	-0.0154	-0.0919	0.0071	-0.0155	0.0114	0.0071
0.899	4.07	6.01	-0.0037	-0.0921	0.0041	-0.0110	0.0110	0.0041
0.897	8.04	6.01	0.0108	-0.0904	-0.0008	-0.0036	0.0121	-0.0008
0.901	11.32	6.01	0.0256	-0.0860	-0.0053	0.0054	0.0148	-0.0053
0.802	0.03	0.95	-0.0136	0.0110	0.0057	-0.0136	0.0110	0.0057
0.804	0.03	2.00	-0.0152	-0.0136	0.0071	-0.0152	0.0116	0.0071
0.803	0.05	3.23	-0.0146	-0.0457	0.0068	-0.0146	0.0101	0.0068
0.801	0.06	4.48	-0.0141	-0.0781	0.0070	-0.0142	0.0112	0.0070
0.802	0.07	5.49	-0.0147	-0.1046	0.0070	-0.0149	0.0115	0.0070
0.601	0.00	0.98	-0.0159	0.0112	0.0076	-0.0159	0.0112	0.0076
0.603	0.04	1.99	-0.0137	-0.0340	0.0055	-0.0137	0.0105	0.0055
0.600	0.05	3.19	-0.0179	-0.0890	0.0085	-0.0180	0.0093	0.0085
0.601	0.06	3.99	-0.0162	-0.1252	0.0073	-0.0163	0.0109	0.0073
0.601	0.07	4.80	-0.0154	-0.1631	0.0068	-0.0157	0.0109	0.0068
0.602	0.07	5.51	-0.0139	-0.1954	0.0066	-0.0142	0.0113	0.0066
0.600	0.01	0.99	-0.0163	0.0106	0.0081	-0.0163	0.0106	0.0081
0.601	4.02	1.00	-0.0220	0.0100	0.0131	-0.0220	0.0100	0.0131
0.602	8.01	1.00	-0.0137	0.0103	0.0075	-0.0137	0.0103	0.0075
0.602	11.29	1.00	-0.0043	0.0123	0.0000	-0.0043	0.0123	0.0000
0.603	0.07	4.79	-0.0157	-0.1616	0.0072	-0.0159	0.0110	0.0072
0.603	4.06	4.80	-0.0009	-0.1627	0.0048	-0.0131	0.0097	0.0048
0.602	8.04	4.80	0.0184	-0.1609	0.0011	-0.0058	0.0104	0.0011
0.603	11.43	4.80	0.0368	-0.1567	-0.0038	0.0025	0.0127	-0.0038

Table 31. Concluded

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
0.202	0.03	0.99	-0.0218	0.0098	0.0091	-0.0218	0.0098	0.0091
0.202	0.03	1.51	-0.0289	-0.2125	0.0067	-0.0291	0.0078	0.0067
0.202	0.03	2.01	-0.0341	-0.3941	0.0052	-0.0343	0.0081	0.0052
0.202	0.04	2.63	-0.0136	-0.6367	0.0051	-0.0141	0.0173	0.0051
0.202	0.06	3.19	-0.0200	-0.8557	0.0096	-0.0209	0.0065	0.0096
0.202	0.06	3.99	-0.0283	-1.1890	0.0104	-0.0296	0.0150	0.0104
0.200	-0.01	1.00	-0.0212	0.0106	0.0126	-0.0212	0.0106	0.0126
0.201	4.02	1.00	-0.0175	0.0072	0.0073	-0.0175	0.0072	0.0073
0.200	8.00	1.00	-0.0115	0.0059	0.0019	-0.0115	0.0059	0.0019
0.201	12.03	1.00	0.0064	0.0132	-0.0035	0.0064	0.0132	-0.0035
0.201	14.51	1.00	0.0033	0.0143	-0.0061	0.0033	0.0143	-0.0061
0.201	0.04	3.20	-0.0188	-0.8710	0.0099	-0.0195	0.0052	0.0099
0.202	4.05	3.20	0.0470	-0.8693	0.0089	-0.0147	0.0026	0.0089
0.201	8.04	3.20	0.1288	-0.8659	0.0028	0.0057	0.0061	0.0028
0.201	12.02	3.20	0.1928	-0.8495	-0.0033	0.0096	0.0111	-0.0033
0.200	14.55	3.20	0.2513	-0.8401	-0.0098	0.0291	0.0156	-0.0098

Table 32. Longitudinal Aerodynamic Characteristics for Standard Nozzle With $\theta = 45^\circ$,
 $\delta_{v,p,l} = 0^\circ$, $\delta_{v,p,r} = 20^\circ$, and $\beta = 0^\circ$

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
1.199	0.03	0.84	-0.0096	0.0198	0.0044	-0.0096	0.0198	0.0044
1.199	0.03	1.99	-0.0102	0.0045	0.0043	-0.0124	0.0173	0.0062
1.198	0.03	3.22	-0.0073	-0.0091	0.0009	-0.0114	0.0181	0.0044
1.201	0.03	4.02	-0.0057	-0.0188	-0.0010	-0.0110	0.0183	0.0034
1.201	0.04	5.49	-0.0016	-0.0367	-0.0041	-0.0087	0.0186	0.0017
1.202	0.06	7.30	0.0026	-0.0595	-0.0069	-0.0056	0.0180	0.0008
1.200	0.06	7.99	0.0042	-0.0687	-0.0080	-0.0045	0.0178	0.0005
0.897	0.02	0.99	-0.0151	0.0121	0.0082	-0.0151	0.0121	0.0082
0.900	0.01	1.97	-0.0017	-0.0119	-0.0039	-0.0054	0.0103	-0.0006
0.903	0.02	3.22	0.0011	-0.0381	-0.0065	-0.0062	0.0097	-0.0004
0.897	0.02	3.98	0.0063	-0.0555	-0.0101	-0.0032	0.0100	-0.0024
0.900	0.03	5.00	0.0108	-0.0774	-0.0135	-0.0012	0.0101	-0.0040
0.900	0.05	5.99	0.0141	-0.0992	-0.0163	0.0009	0.0103	-0.0050
0.900	0.04	7.00	0.0187	-0.1211	-0.0190	0.0044	0.0107	-0.0058
0.900	0.03	1.00	-0.0149	0.0116	0.0083	-0.0149	0.0116	0.0083
0.901	4.04	1.00	-0.0140	0.0112	0.0077	-0.0140	0.0112	0.0077
0.899	8.02	1.00	-0.0085	0.0121	0.0036	-0.0085	0.0121	0.0036
0.901	11.16	0.99	0.0011	0.0153	-0.0023	0.0011	0.0153	-0.0023
0.901	0.05	5.99	0.0137	-0.0990	-0.0161	0.0006	0.0101	-0.0048
0.901	4.05	6.00	0.0236	-0.0977	-0.0182	0.0029	0.0103	-0.0069
0.900	8.03	5.99	0.0405	-0.0938	-0.0235	0.0123	0.0127	-0.0122
0.900	11.08	5.99	0.0532	-0.0894	-0.0274	0.0193	0.0156	-0.0160
0.802	0.02	1.00	-0.0132	0.0096	0.0057	-0.0132	0.0096	0.0057
0.804	0.04	1.99	0.0010	-0.0193	-0.0059	-0.0037	0.0090	-0.0016
0.799	0.03	3.23	0.0038	-0.0530	-0.0079	-0.0054	0.0080	-0.0001
0.799	0.06	4.50	0.0100	-0.0880	-0.0137	-0.0038	0.0093	-0.0027
0.799	0.04	5.49	0.0154	-0.1155	-0.0175	-0.0005	0.0093	-0.0043
0.602	0.01	1.00	-0.0105	0.0095	0.0040	-0.0105	0.0095	0.0040
0.603	0.04	1.98	0.0114	-0.0408	-0.0150	0.0031	0.0091	-0.0074
0.602	0.04	3.20	0.0143	-0.0991	-0.0167	-0.0019	0.0074	-0.0030
0.602	0.05	4.00	0.0186	-0.1375	-0.0219	-0.0026	0.0093	-0.0047
0.602	0.06	4.81	0.0238	-0.1773	-0.0264	-0.0026	0.0086	-0.0060
0.601	0.05	5.49	0.0293	-0.2111	-0.0298	0.0011	0.0093	-0.0065
0.601	0.01	1.02	-0.0108	0.0083	0.0041	-0.0108	0.0083	0.0041
0.602	4.03	1.01	-0.0114	0.0078	0.0040	-0.0114	0.0078	0.0040
0.603	8.00	1.01	-0.0031	0.0094	-0.0017	-0.0031	0.0094	-0.0017
0.602	10.98	1.01	0.0095	0.0127	-0.0093	0.0095	0.0127	-0.0093
0.599	0.05	4.79	0.0250	-0.1788	-0.0269	-0.0016	0.0083	-0.0064
0.600	4.05	4.80	0.0398	-0.1764	-0.0277	0.0002	0.0083	-0.0072
0.599	8.03	4.80	0.0600	-0.1714	-0.0315	0.0077	0.0103	-0.0110
0.599	10.16	4.80	0.0711	-0.1678	-0.0346	0.0119	0.0120	-0.0141

Table 32. Concluded

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
0.203	0.03	0.99	-0.0122	0.0123	-0.0014	-0.0122	0.0123	-0.0014
0.202	0.04	1.51	0.0232	-0.2350	-0.0449	-0.0196	0.0160	-0.0053
0.203	0.05	2.03	0.0705	-0.4448	-0.0798	-0.0063	0.0164	-0.0103
0.203	0.04	2.60	0.1007	-0.6726	-0.1128	-0.0094	0.0210	-0.0153
0.203	0.05	3.18	0.1254	-0.9242	-0.1240	-0.0165	0.0058	-0.0040
0.201	0.05	4.00	0.1699	-1.2890	-0.1588	-0.0191	0.0202	-0.0049
0.200	0.02	1.00	-0.0130	0.0125	0.0007	-0.0130	0.0125	0.0007
0.201	4.03	1.00	-0.0139	0.0082	-0.0008	-0.0139	0.0082	-0.0008
0.201	8.00	1.00	0.0105	0.0075	-0.0061	0.0105	0.0075	-0.0061
0.201	12.03	1.00	0.0097	0.0152	-0.0102	0.0097	0.0152	-0.0102
0.201	14.54	1.00	0.0094	0.0133	-0.0134	0.0094	0.0133	-0.0134
0.202	0.04	3.20	0.1264	-0.9446	-0.1242	-0.0182	0.0054	-0.0019
0.202	4.05	3.20	0.1947	-0.9310	-0.1239	-0.0160	0.0072	-0.0016
0.202	8.02	3.20	0.2827	-0.9129	-0.1286	0.0082	0.0059	-0.0065
0.202	12.04	3.20	0.3446	-0.8860	-0.1346	0.0070	0.0095	-0.0128
0.202	14.53	3.20	0.3927	-0.8680	-0.1356	0.0163	0.0124	-0.0137

Table 33. Longitudinal Aerodynamic Characteristics for Long-Flap Nozzle With $\theta = 0^\circ$,
 $\delta_{v,p,l} = 0^\circ$, $\delta_{v,p,r} = 0^\circ$, and $\beta = 0^\circ$

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
1.201	-0.02	0.89	-0.0040	0.0191	0.0009	-0.0040	0.0191	0.0009
1.199	-0.01	2.00	-0.0046	0.0031	0.0009	-0.0045	0.0174	0.0009
1.200	-0.02	3.22	-0.0049	-0.0118	0.0010	-0.0049	0.0180	0.0010
1.199	-0.02	4.00	-0.0052	-0.0216	0.0010	-0.0052	0.0180	0.0010
1.201	-0.02	5.52	-0.0053	-0.0419	0.0012	-0.0053	0.0167	0.0012
1.202	-0.01	7.34	-0.0047	-0.0661	0.0015	-0.0047	0.0154	0.0015
1.200	-0.01	8.02	-0.0048	-0.0757	0.0015	-0.0048	0.0145	0.0015
0.899	-0.01	1.07	-0.0047	0.0074	0.0004	-0.0047	0.0074	0.0004
0.900	-0.01	2.03	-0.0052	-0.0193	0.0002	-0.0052	0.0068	0.0002
0.901	0.00	3.21	-0.0050	-0.0458	0.0007	-0.0050	0.0066	0.0007
0.899	0.00	4.01	-0.0049	-0.0643	0.0009	-0.0049	0.0064	0.0009
0.899	0.01	5.03	-0.0054	-0.0876	0.0012	-0.0054	0.0060	0.0012
0.902	0.00	5.99	-0.0059	-0.1085	0.0012	-0.0059	0.0059	0.0012
0.900	0.01	7.00	-0.0058	-0.1324	0.0014	-0.0058	0.0050	0.0014
0.900	-0.02	1.07	-0.0050	0.0073	0.0007	-0.0050	0.0073	0.0007
0.902	4.00	1.08	-0.0028	0.0079	-0.0002	-0.0028	0.0079	-0.0002
0.900	8.00	1.08	0.0042	0.0094	-0.0030	0.0042	0.0094	-0.0030
0.901	11.98	1.07	0.0117	0.0127	-0.0064	0.0117	0.0127	-0.0064
0.901	0.00	6.05	-0.0061	-0.1103	0.0012	-0.0061	0.0055	0.0012
0.900	4.01	5.99	0.0066	-0.1086	-0.0010	-0.0015	0.0061	-0.0010
0.900	8.01	6.02	0.0225	-0.1072	-0.0048	0.0064	0.0073	-0.0048
0.899	12.00	6.02	0.0389	-0.1023	-0.0086	0.0148	0.0110	-0.0086
0.798	0.02	1.04	-0.0056	0.0059	0.0007	-0.0056	0.0059	0.0007
0.799	0.00	2.02	-0.0068	-0.0264	0.0005	-0.0068	0.0063	0.0005
0.801	0.00	3.20	-0.0067	-0.0604	0.0008	-0.0067	0.0058	0.0008
0.800	0.00	4.51	-0.0063	-0.0979	0.0014	-0.0063	0.0055	0.0014
0.800	0.02	5.52	-0.0070	-0.1274	0.0014	-0.0070	0.0047	0.0014
0.800	0.01	6.50	-0.0073	-0.1560	0.0018	-0.0073	0.0041	0.0018
0.599	-0.01	1.02	-0.0078	0.0050	0.0008	-0.0078	0.0050	0.0008
0.601	0.00	1.99	-0.0098	-0.0506	0.0013	-0.0098	0.0059	0.0013
0.598	0.01	3.21	-0.0087	-0.1144	0.0024	-0.0087	0.0049	0.0024
0.599	0.00	4.01	-0.0098	-0.1537	0.0028	-0.0098	0.0054	0.0028
0.600	0.02	4.82	-0.0100	-0.1949	0.0028	-0.0100	0.0046	0.0028
0.601	0.02	5.50	-0.0099	-0.2284	0.0035	-0.0100	0.0043	0.0035
0.600	-0.01	1.03	-0.0084	0.0053	0.0014	-0.0084	0.0053	0.0014
0.601	4.01	1.03	-0.0044	0.0052	0.0000	-0.0044	0.0052	0.0000
0.598	8.00	1.03	0.0011	0.0064	-0.0035	0.0011	0.0064	-0.0035
0.600	11.99	1.02	0.0105	0.0098	-0.0077	0.0105	0.0098	-0.0077
0.600	0.01	4.80	-0.0102	-0.1936	0.0029	-0.0103	0.0047	0.0029
0.601	4.01	4.81	0.0087	-0.1936	0.0002	-0.0051	0.0044	0.0002
0.600	8.00	4.80	0.0299	-0.1903	-0.0040	0.0023	0.0060	-0.0040
0.601	12.04	4.79	0.0553	-0.1838	-0.0090	0.0140	0.0096	-0.0090

Table 33. Concluded

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
0.202	0.01	0.99	-0.0051	-0.0015	0.0057	-0.0051	-0.0015	0.0057
0.202	0.01	1.00	-0.0089	-0.0009	0.0063	-0.0089	-0.0009	0.0063
0.203	0.02	1.53	-0.0167	-0.2866	0.0071	-0.0168	0.0071	0.0071
0.202	0.01	2.02	-0.0236	-0.5112	0.0117	-0.0237	0.0037	0.0117
0.201	0.02	2.63	-0.0289	-0.7769	0.0138	-0.0292	0.0095	0.0138
0.202	0.01	3.19	-0.0083	-1.0260	0.0159	-0.0086	0.0114	0.0159
0.202	0.02	4.01	-0.0185	-1.3970	0.0199	-0.0189	0.0064	0.0199
0.202	0.01	5.02	-0.0141	-1.8360	0.0237	-0.0145	0.0062	0.0237
0.200	0.00	1.00	-0.0278	0.0010	-0.0008	-0.0278	0.0010	-0.0008
0.201	4.01	1.00	-0.0269	0.0024	-0.0002	-0.0269	0.0024	-0.0002
0.201	8.00	1.00	0.0001	0.0008	-0.0048	0.0001	0.0008	-0.0048
0.201	12.01	1.00	-0.0021	-0.0013	-0.0088	-0.0021	-0.0013	-0.0088
0.201	14.50	1.00	-0.0026	0.0032	-0.0083	-0.0026	0.0032	-0.0083
0.203	0.00	3.21	-0.0350	-1.0250	0.0115	-0.0349	0.0078	0.0115
0.202	4.01	3.20	0.0385	-1.0300	0.0101	-0.0340	0.0054	0.0101
0.202	8.02	3.20	0.1344	-1.0220	0.0077	-0.0105	0.0071	0.0077
0.203	12.02	3.20	0.2064	-1.0060	0.0011	-0.0090	0.0054	0.0011
0.203	14.52	3.20	0.2635	-0.9865	0.0010	0.0048	0.0120	0.0010

Table 34. Longitudinal Aerodynamic Characteristics for Long-Flap Nozzle With $\theta = 0^\circ$,
 $\delta_{v,p,l} = 20^\circ$, $\delta_{v,p,r} = 20^\circ$, and $\beta = 0^\circ$

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
1.201	-0.03	0.72	0.0390	0.0320	-0.0418	0.0390	0.0320	-0.0418
1.185	-0.02	2.00	0.0431	0.0165	-0.0439	0.0386	0.0286	-0.0397
1.199	-0.03	3.23	0.0521	0.0047	-0.0527	0.0416	0.0294	-0.0430
1.197	-0.03	3.96	0.0564	-0.0027	-0.0560	0.0420	0.0301	-0.0435
1.202	-0.05	5.52	0.0632	-0.0202	-0.0624	0.0430	0.0278	-0.0449
1.201	-0.05	7.32	0.0723	-0.0408	-0.0701	0.0451	0.0229	-0.0468
1.203	-0.06	8.04	0.0748	-0.0487	-0.0727	0.0450	0.0211	-0.0473
0.898	-0.02	0.95	0.0254	0.0164	-0.0260	0.0254	0.0164	-0.0260
0.900	-0.03	2.05	0.0341	-0.0078	-0.0339	0.0259	0.0141	-0.0263
0.899	-0.03	3.20	0.0597	-0.0251	-0.0564	0.0413	0.0183	-0.0394
0.903	-0.03	3.99	0.0698	-0.0386	-0.0663	0.0442	0.0199	-0.0439
0.901	-0.04	5.01	0.0830	-0.0570	-0.0776	0.0504	0.0203	-0.0492
0.896	-0.05	6.01	0.0948	-0.0770	-0.0878	0.0551	0.0169	-0.0534
0.901	-0.05	6.99	0.1046	-0.0945	-0.0951	0.0586	0.0136	-0.0557
0.901	0.00	0.96	0.0255	0.0166	-0.0262	0.0255	0.0166	-0.0262
0.901	4.00	0.93	0.0354	0.0227	-0.0349	0.0354	0.0227	-0.0349
0.897	8.00	0.90	0.0458	0.0302	-0.0425	0.0458	0.0302	-0.0425
0.904	11.97	0.87	0.0599	0.0421	-0.0545	0.0599	0.0421	-0.0545
0.901	-0.05	6.00	0.0943	-0.0758	-0.0869	0.0549	0.0170	-0.0529
0.900	3.95	6.04	0.1105	-0.0675	-0.0943	0.0644	0.0232	-0.0600
0.899	7.97	6.01	0.1259	-0.0543	-0.1017	0.0737	0.0326	-0.0676
0.905	9.97	6.05	0.1344	-0.0470	-0.1062	0.0796	0.0374	-0.0723
0.797	-0.01	0.97	0.0359	0.0163	-0.0346	0.0359	0.0163	-0.0346
0.800	-0.02	2.01	0.0472	-0.0129	-0.0439	0.0372	0.0139	-0.0346
0.802	-0.03	3.24	0.0720	-0.0381	-0.0661	0.0484	0.0173	-0.0445
0.800	-0.04	4.53	0.0909	-0.0686	-0.0836	0.0538	0.0191	-0.0509
0.801	-0.02	5.51	0.1034	-0.0915	-0.0941	0.0578	0.0162	-0.0547
0.601	-0.03	1.00	0.0370	0.0134	-0.0348	0.0370	0.0134	-0.0348
0.599	-0.03	1.98	0.0613	-0.0346	-0.0561	0.0439	0.0121	-0.0398
0.601	-0.03	3.20	0.0957	-0.0824	-0.0851	0.0545	0.0147	-0.0472
0.599	-0.04	4.01	0.1172	-0.1157	-0.1034	0.0588	0.0176	-0.0524
0.599	-0.05	4.78	0.1327	-0.1486	-0.1177	0.0626	0.0183	-0.0563
0.598	-0.06	5.52	0.1474	-0.1813	-0.1303	0.0656	0.0127	-0.0591
0.597	-0.01	0.99	0.0394	0.0137	-0.0363	0.0394	0.0137	-0.0363
0.601	4.01	0.98	0.0447	0.0194	-0.0401	0.0447	0.0194	-0.0401
0.600	7.99	0.97	0.0519	0.0266	-0.0450	0.0519	0.0266	-0.0450
0.600	10.02	0.96	0.0559	0.0308	-0.0492	0.0559	0.0308	-0.0492
0.599	-0.05	4.80	0.1330	-0.1495	-0.1184	0.0626	0.0183	-0.0567
0.598	3.96	4.80	0.1526	-0.1364	-0.1255	0.0705	0.0262	-0.0637
0.598	7.98	4.80	0.1744	-0.1208	-0.1337	0.0810	0.0360	-0.0717
0.603	9.99	4.82	0.1859	-0.1096	-0.1382	0.0882	0.0418	-0.0770

Table 34. Concluded

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
0.203	0.01	0.99	0.0325	0.0109	-0.0319	0.0325	0.0109	-0.0319
0.200	-0.02	1.51	0.1264	-0.2265	-0.1255	0.0353	0.0214	-0.0346
0.200	-0.03	2.00	0.2022	-0.4132	-0.1894	0.0440	0.0115	-0.0420
0.201	-0.05	2.60	0.2692	-0.6464	-0.2577	0.0265	0.0150	-0.0414
0.200	-0.03	3.21	0.4375	-0.8631	-0.3955	0.0655	0.0134	-0.0536
0.201	-0.04	4.01	0.5786	-1.1650	-0.5194	0.0572	0.0255	-0.0638
0.200	0.01	1.00	0.0239	0.0102	-0.0317	0.0239	0.0102	-0.0317
0.200	4.01	1.00	0.0354	0.0164	-0.0335	0.0354	0.0164	-0.0335
0.200	7.98	1.00	0.0349	0.0229	-0.0396	0.0349	0.0229	-0.0396
0.200	12.01	1.00	0.0587	0.0305	-0.0481	0.0587	0.0305	-0.0481
0.200	14.50	1.00	0.0562	0.0378	-0.0531	0.0562	0.0378	-0.0531
0.201	0.01	3.20	0.4407	-0.8560	-0.3902	0.0708	0.0143	-0.0506
0.201	4.01	3.20	0.4982	-0.8245	-0.3992	0.0692	0.0165	-0.0602
0.201	8.00	3.21	0.5860	-0.7802	-0.4107	0.0967	0.0331	-0.0699
0.201	12.01	3.22	0.6402	-0.7405	-0.4236	0.0918	0.0408	-0.0808
0.201	14.48	3.23	0.6960	-0.7046	-0.4322	0.1142	0.0523	-0.0894

Table 35. Longitudinal Aerodynamic Characteristics for Long-Flap Nozzle With $\theta = 30^\circ$,
 $\delta_{v,p,l} = 0^\circ$, $\delta_{v,p,r} = 0^\circ$, and $\beta = 0^\circ$

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
1.200	0.04	0.89	-0.0090	0.0186	0.0047	-0.0090	0.0186	0.0047
1.199	0.05	1.99	-0.0099	0.0026	0.0050	-0.0099	0.0167	0.0050
1.201	0.05	3.19	-0.0089	-0.0120	0.0046	-0.0090	0.0172	0.0046
1.200	0.05	3.99	-0.0086	-0.0222	0.0045	-0.0086	0.0172	0.0045
1.199	0.05	5.47	-0.0088	-0.0424	0.0044	-0.0088	0.0158	0.0044
1.200	0.05	7.30	-0.0094	-0.0672	0.0042	-0.0095	0.0139	0.0042
1.201	0.06	8.01	-0.0094	-0.0765	0.0041	-0.0095	0.0134	0.0041
0.900	0.03	1.08	-0.0080	0.0069	0.0022	-0.0080	0.0069	0.0022
0.902	0.04	1.97	-0.0090	-0.0178	0.0026	-0.0091	0.0069	0.0026
0.898	0.04	3.18	-0.0098	-0.0459	0.0029	-0.0099	0.0062	0.0029
0.899	0.04	4.02	-0.0086	-0.0649	0.0028	-0.0087	0.0059	0.0028
0.900	0.05	4.99	-0.0087	-0.0873	0.0027	-0.0087	0.0051	0.0027
0.900	0.05	6.01	-0.0090	-0.1110	0.0028	-0.0091	0.0045	0.0028
0.899	0.05	7.00	-0.0097	-0.1339	0.0028	-0.0098	0.0041	0.0028
0.899	0.02	1.09	-0.0079	0.0066	0.0023	-0.0079	0.0066	0.0023
0.901	4.05	1.09	-0.0057	0.0070	0.0006	-0.0057	0.0070	0.0006
0.899	8.02	1.08	0.0019	0.0084	-0.0037	0.0019	0.0084	-0.0037
0.897	11.03	1.08	0.0117	0.0104	-0.0093	0.0117	0.0104	-0.0093
0.899	0.04	5.99	-0.0092	-0.1108	0.0027	-0.0093	0.0044	0.0027
0.900	4.05	6.00	0.0016	-0.1110	0.0004	-0.0065	0.0039	0.0004
0.897	8.02	5.99	0.0182	-0.1095	-0.0049	0.0021	0.0051	-0.0049
0.898	11.42	5.99	0.0374	-0.1048	-0.0120	0.0145	0.0084	-0.0120
0.799	0.04	1.05	-0.0068	0.0064	0.0016	-0.0068	0.0064	0.0016
0.801	0.05	1.97	-0.0076	-0.0253	0.0018	-0.0076	0.0059	0.0018
0.800	0.05	3.21	-0.0084	-0.0605	0.0022	-0.0084	0.0058	0.0022
0.799	0.05	4.50	-0.0093	-0.0985	0.0023	-0.0094	0.0049	0.0023
0.801	0.05	5.49	-0.0101	-0.1268	0.0025	-0.0102	0.0041	0.0025
0.597	0.04	1.04	-0.0090	0.0035	0.0029	-0.0090	0.0035	0.0029
0.599	0.05	1.99	-0.0075	-0.0508	0.0024	-0.0075	0.0059	0.0024
0.600	0.05	3.19	-0.0091	-0.1120	0.0029	-0.0092	0.0049	0.0029
0.600	0.05	4.00	-0.0099	-0.1541	0.0029	-0.0101	0.0044	0.0029
0.600	0.04	4.81	-0.0110	-0.1944	0.0034	-0.0112	0.0043	0.0034
0.599	0.04	5.50	-0.0102	-0.2304	0.0034	-0.0103	0.0042	0.0034
0.599	0.02	1.03	-0.0051	0.0065	0.0019	-0.0051	0.0065	0.0019
0.600	4.03	1.03	-0.0051	0.0065	0.0007	-0.0051	0.0065	0.0007
0.598	8.01	1.03	0.0014	0.0067	-0.0029	0.0014	0.0067	-0.0029
0.601	11.08	1.03	0.0117	0.0088	-0.0083	0.0117	0.0088	-0.0083
0.598	0.04	4.80	-0.0108	-0.1953	0.0033	-0.0110	0.0044	0.0033
0.600	4.05	4.80	0.0072	-0.1943	0.0006	-0.0068	0.0040	0.0006
0.599	8.02	4.80	0.0298	-0.1925	-0.0045	0.0020	0.0049	-0.0045
0.599	11.08	4.80	0.0493	-0.1886	-0.0110	0.0109	0.0072	-0.0110

Table 35. Concluded

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
0.200	0.01	1.00	-0.0071	0.0054	-0.0016	-0.0071	0.0054	-0.0016
0.201	0.03	1.51	-0.0185	-0.2785	-0.0004	-0.0187	0.0070	-0.0004
0.202	0.03	2.01	-0.0252	-0.4975	0.0040	-0.0255	0.0115	0.0040
0.203	0.04	2.62	-0.0326	-0.7673	0.0074	-0.0332	0.0091	0.0074
0.203	0.05	3.18	-0.0390	-1.0120	0.0090	-0.0398	0.0076	0.0090
0.201	0.05	3.98	-0.0475	-1.3890	0.0130	-0.0487	0.0044	0.0130
0.200	0.02	1.01	-0.0226	0.0083	0.0010	-0.0226	0.0083	0.0010
0.200	4.04	1.01	-0.0030	0.0051	-0.0001	-0.0030	0.0051	-0.0001
0.201	8.01	1.00	-0.0021	0.0061	-0.0071	-0.0021	0.0061	-0.0071
0.201	12.05	1.00	-0.0028	0.0043	-0.0120	-0.0028	0.0043	-0.0120
0.201	14.53	1.00	0.0193	0.0142	-0.0165	0.0193	0.0142	-0.0165
0.202	0.04	3.22	-0.0404	-1.0390	0.0118	-0.0413	0.0079	0.0118
0.203	4.05	3.22	0.0356	-1.0320	0.0087	-0.0378	0.0040	0.0087
0.202	8.02	3.22	0.1321	-1.0290	0.0029	-0.0134	0.0033	0.0029
0.202	12.05	3.21	0.2047	-1.0090	-0.0062	-0.0125	0.0084	-0.0062
0.203	14.53	3.21	0.2682	-0.9902	-0.0100	0.0084	0.0121	-0.0100

Table 36. Longitudinal Aerodynamic Characteristics for Long-Flap Nozzle With $\theta = 30^\circ$,
 $\delta_{v,p,l} = 20^\circ$, $\delta_{v,p,r} = 20^\circ$, and $\beta = 0^\circ$

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
1.200	0.01	0.76	0.0355	0.0298	-0.0358	0.0355	0.0298	-0.0358
1.201	-0.03	2.06	0.0385	0.0134	-0.0368	0.0347	0.0262	-0.0329
1.200	0.00	3.21	0.0487	0.0035	-0.0464	0.0393	0.0283	-0.0378
1.199	-0.02	3.99	0.0521	-0.0044	-0.0497	0.0401	0.0289	-0.0389
1.199	-0.04	5.52	0.0603	-0.0210	-0.0561	0.0430	0.0286	-0.0410
1.199	-0.05	7.33	0.0676	-0.0424	-0.0632	0.0440	0.0265	-0.0428
1.199	-0.05	8.02	0.0715	-0.0502	-0.0656	0.0455	0.0261	-0.0432
0.900	0.01	0.95	0.0253	0.0155	-0.0255	0.0253	0.0155	-0.0255
0.901	-0.02	2.03	0.0333	-0.0083	-0.0319	0.0268	0.0139	-0.0252
0.900	-0.01	3.22	0.0593	-0.0270	-0.0538	0.0426	0.0173	-0.0384
0.901	-0.02	3.98	0.0698	-0.0406	-0.0618	0.0484	0.0182	-0.0427
0.900	-0.02	5.03	0.0793	-0.0602	-0.0707	0.0515	0.0186	-0.0462
0.900	-0.03	6.00	0.0876	-0.0788	-0.0772	0.0539	0.0183	-0.0478
0.899	-0.05	7.01	0.0947	-0.0987	-0.0833	0.0548	0.0177	-0.0487
0.902	0.02	0.96	0.0251	0.0147	-0.0250	0.0251	0.0147	-0.0250
0.901	4.03	0.95	0.0357	0.0208	-0.0342	0.0357	0.0208	-0.0342
0.897	8.02	0.94	0.0490	0.0292	-0.0441	0.0490	0.0292	-0.0441
0.900	11.69	0.92	0.0632	0.0393	-0.0541	0.0632	0.0393	-0.0541
0.897	-0.04	5.98	0.0879	-0.0794	-0.0771	0.0540	0.0182	-0.0476
0.900	3.96	6.03	0.0995	-0.0706	-0.0843	0.0589	0.0243	-0.0548
0.901	7.95	6.03	0.1193	-0.0585	-0.0939	0.0723	0.0333	-0.0644
0.900	11.72	6.03	0.1401	-0.0426	-0.1060	0.0869	0.0461	-0.0765
0.800	0.02	0.99	0.0353	0.0148	-0.0331	0.0353	0.0148	-0.0331
0.800	0.00	1.99	0.0464	-0.0133	-0.0422	0.0384	0.0140	-0.0340
0.799	-0.02	3.26	0.0683	-0.0406	-0.0624	0.0464	0.0166	-0.0424
0.800	0.00	4.53	0.0839	-0.0714	-0.0752	0.0526	0.0162	-0.0474
0.800	-0.05	5.51	0.0933	-0.0948	-0.0826	0.0544	0.0165	-0.0485
0.599	0.01	0.99	0.0348	0.0128	-0.0323	0.0348	0.0128	-0.0323
0.600	-0.01	1.99	0.0586	-0.0357	-0.0514	0.0444	0.0129	-0.0369
0.600	-0.02	3.23	0.0874	-0.0853	-0.0780	0.0493	0.0150	-0.0430
0.600	-0.03	4.04	0.1031	-0.1200	-0.0910	0.0543	0.0148	-0.0473
0.600	-0.04	4.78	0.1164	-0.1514	-0.1008	0.0572	0.0153	-0.0485
0.597	-0.03	5.53	0.1263	-0.1862	-0.1100	0.0563	0.0139	-0.0487
0.600	0.02	1.00	0.0364	0.0127	-0.0329	0.0364	0.0127	-0.0329
0.605	4.03	0.99	0.0396	0.0175	-0.0360	0.0396	0.0175	-0.0360
0.600	8.02	0.98	0.0471	0.0244	-0.0413	0.0471	0.0244	-0.0413
0.596	12.02	0.97	0.0589	0.0348	-0.0504	0.0589	0.0348	-0.0504
0.601	-0.02	4.80	0.1164	-0.1519	-0.1012	0.0572	0.0148	-0.0489
0.600	3.99	4.81	0.1318	-0.1415	-0.1056	0.0608	0.0213	-0.0531
0.600	8.00	4.80	0.1511	-0.1266	-0.1138	0.0688	0.0311	-0.0613
0.598	12.05	4.76	0.1744	-0.1077	-0.1249	0.0817	0.0429	-0.0726

Table 36. Concluded

MACH	ALPHA	NPR	CL	CD-F	CM	CLA	CDA	CMA
0.201	0.02	1.00	0.0103	0.0121	-0.0362	0.0103	0.0121	-0.0362
0.201	0.00	1.50	0.1020	-0.2261	-0.1144	0.0406	0.0149	-0.0424
0.201	-0.01	2.03	0.1698	-0.4243	-0.1748	0.0386	0.0226	-0.0404
0.202	-0.01	2.61	0.2393	-0.6449	-0.2277	0.0298	0.0099	-0.0374
0.202	-0.01	3.24	0.3777	-0.8707	-0.3478	0.0394	0.0188	-0.0372
0.201	-0.03	3.99	0.4886	-1.1570	-0.4319	0.0612	0.0216	-0.0482
0.200	0.04	1.00	0.0372	0.0104	-0.0330	0.0372	0.0104	-0.0330
0.202	4.04	1.00	0.0364	0.0130	-0.0375	0.0364	0.0130	-0.0375
0.201	7.99	1.00	0.0396	0.0223	-0.0446	0.0396	0.0223	-0.0446
0.202	12.02	1.00	0.0576	0.0358	-0.0515	0.0576	0.0358	-0.0515
0.202	14.48	1.00	0.0569	0.0388	-0.0612	0.0569	0.0388	-0.0612
0.203	-0.02	3.20	0.3746	-0.8457	-0.3369	0.0468	0.0221	-0.0361
0.203	4.02	3.19	0.4359	-0.8063	-0.3389	0.0513	0.0310	-0.0409
0.200	8.02	3.20	0.5202	-0.7909	-0.3577	0.0642	0.0419	-0.0501
0.200	12.01	3.22	0.5772	-0.7593	-0.3710	0.0563	0.0495	-0.0580
0.200	14.50	3.22	0.6351	-0.7231	-0.3819	0.0786	0.0635	-0.0683

Table 37. Skin-Friction Coefficients Plus Wave-Drag Coefficients

M	Coefficient for—		
	0° cant	30° cant	45° cant
Standard flaps			
0.60	0.0020	0.0020	0.0020
.80	.0020	.0019	.0019
.90	.0019	.0019	.0019
1.20	.0187	.0165	.0185
Long flaps			
0.60	0.0022	0.0021	
.80	.0021	.0021	
.90	.0020	.0020	
1.20	.0141	.0150	

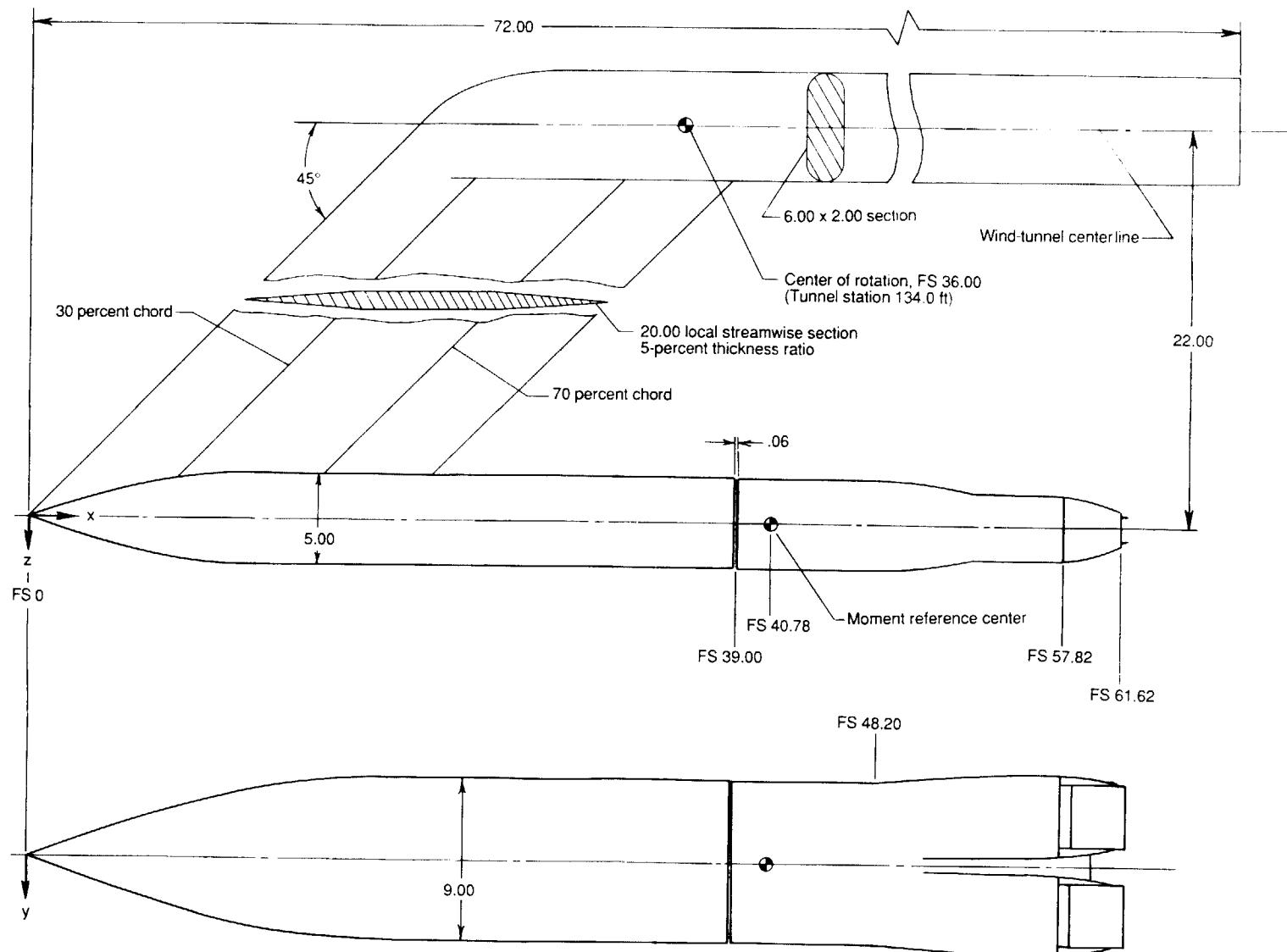
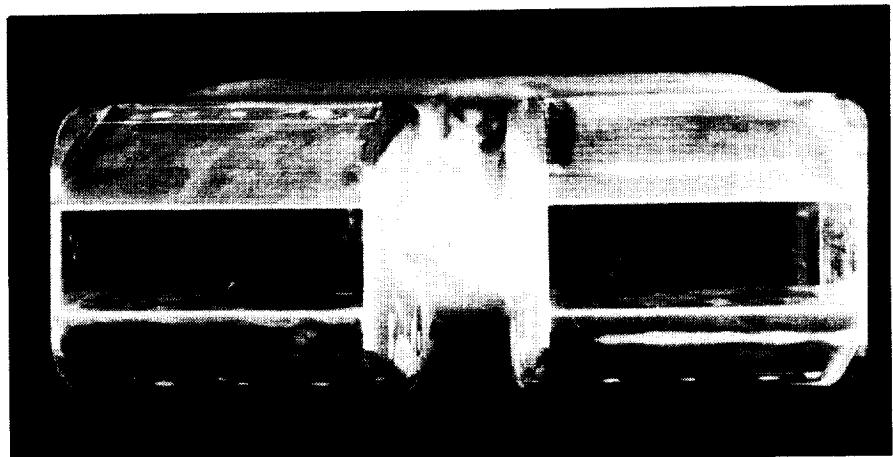
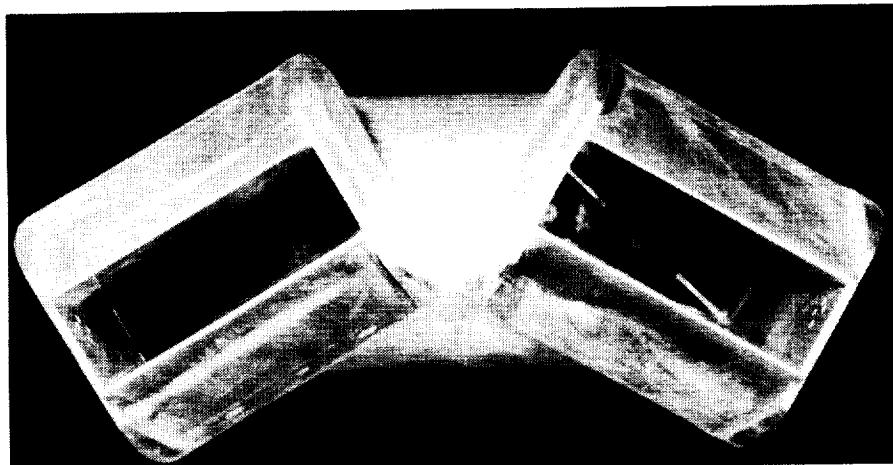


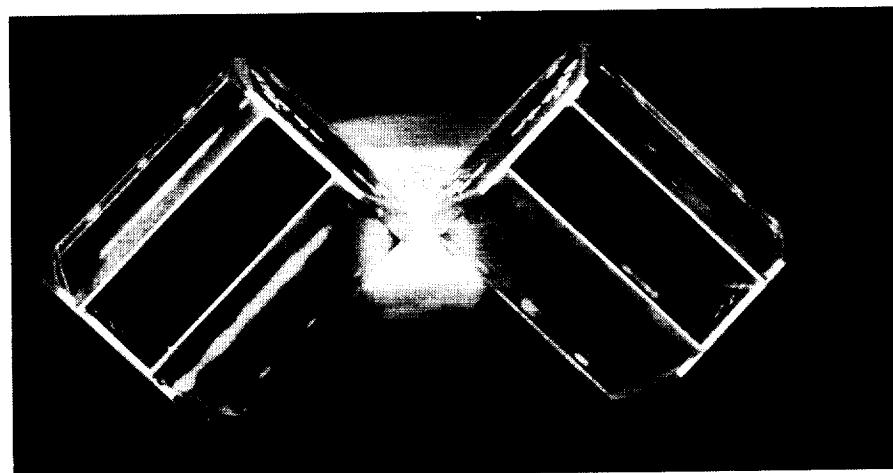
Figure 1. Drawing of model. All linear dimensions in inches.



(a) $\theta = 0^\circ$.



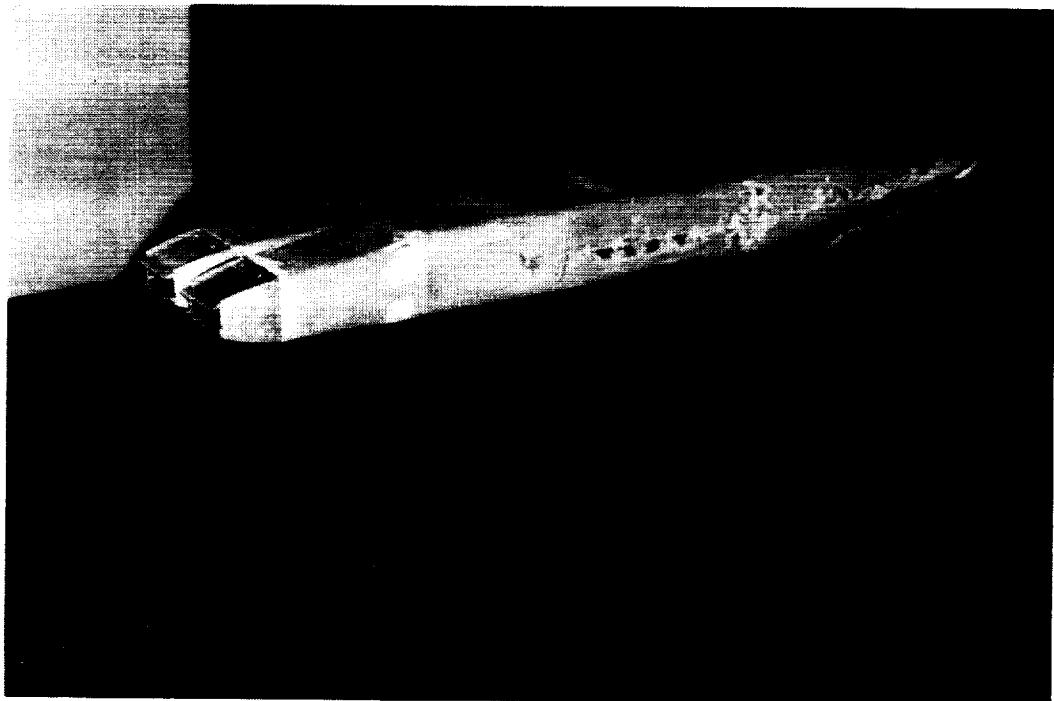
(b) $\theta = 30^\circ$.



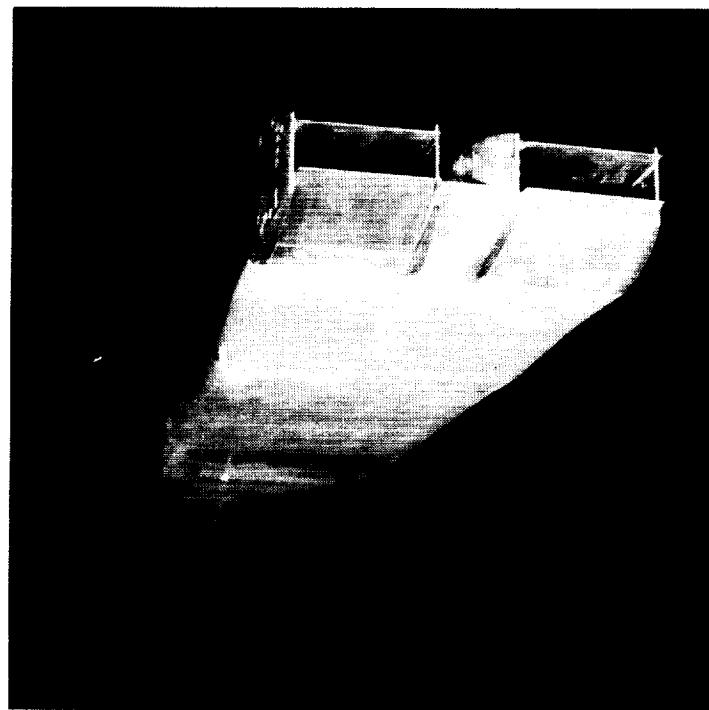
(c) $\theta = 45^\circ$.

L-91-04

Figure 2. Nozzle integrations with $\delta_{v,p} = 0^\circ$.



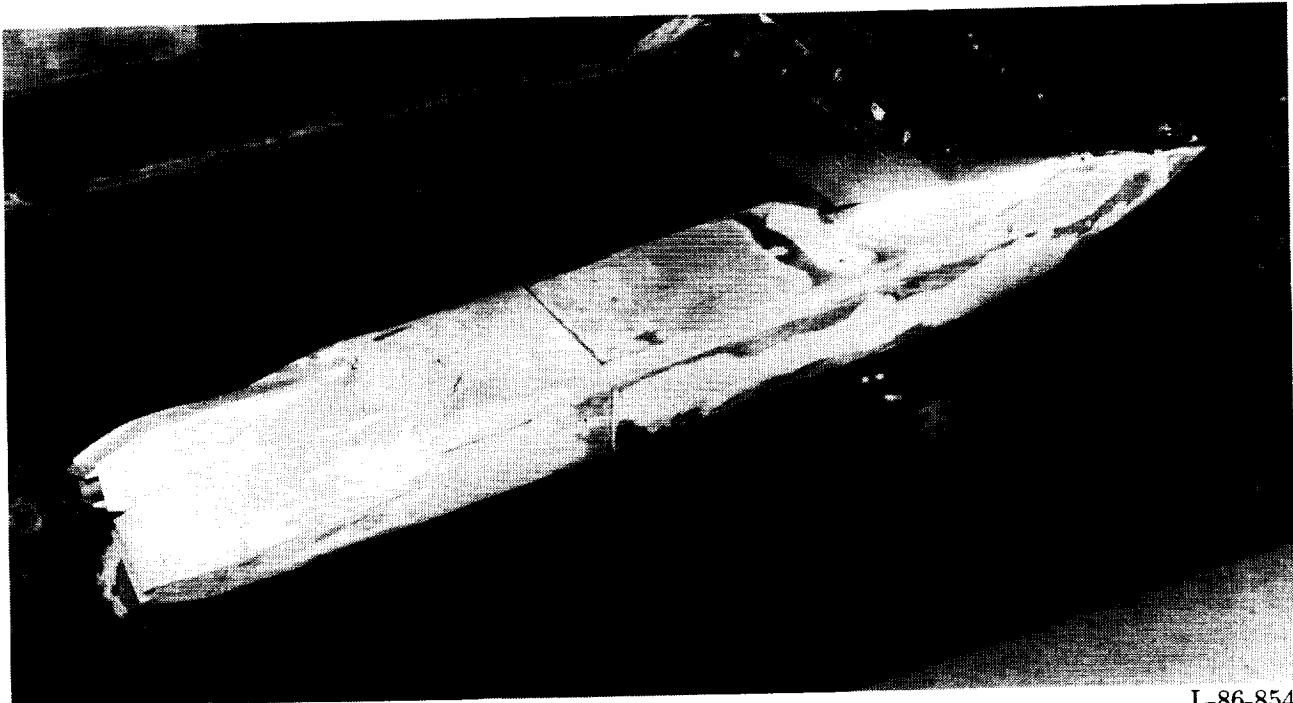
L-83-1,015



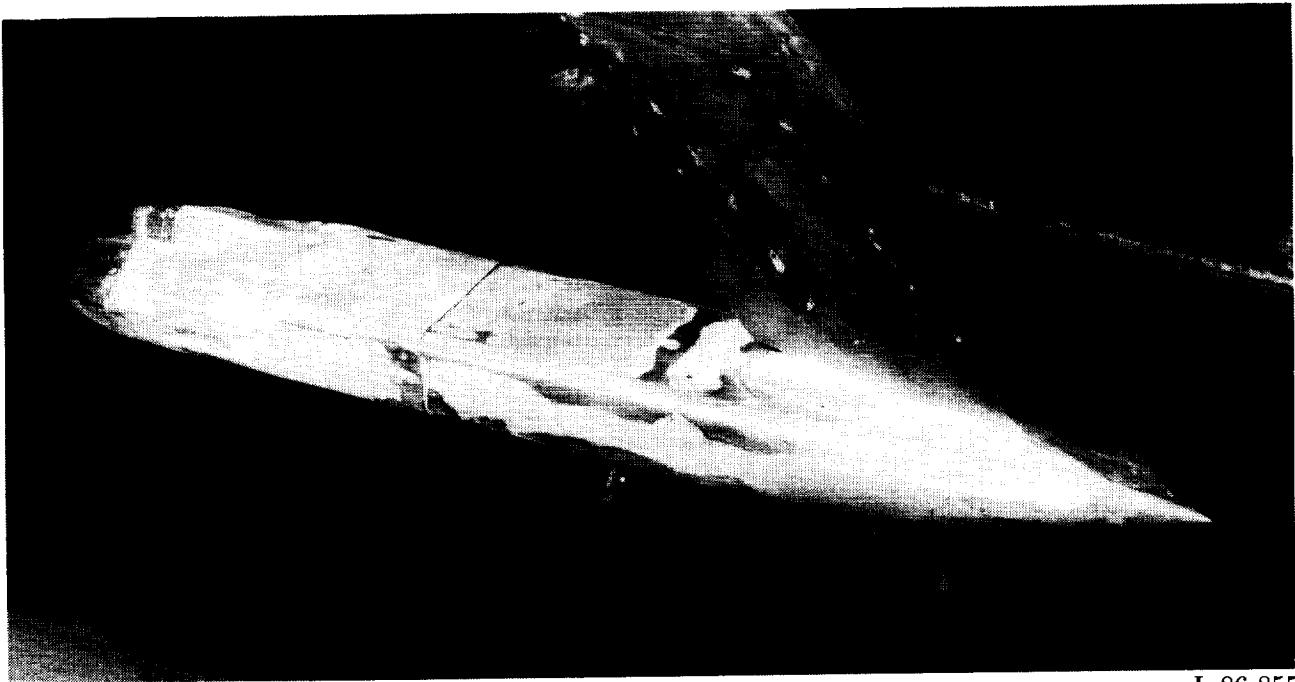
L-83-1,014

(a) $\theta = 0^\circ$.

Figure 3. Various model configurations.



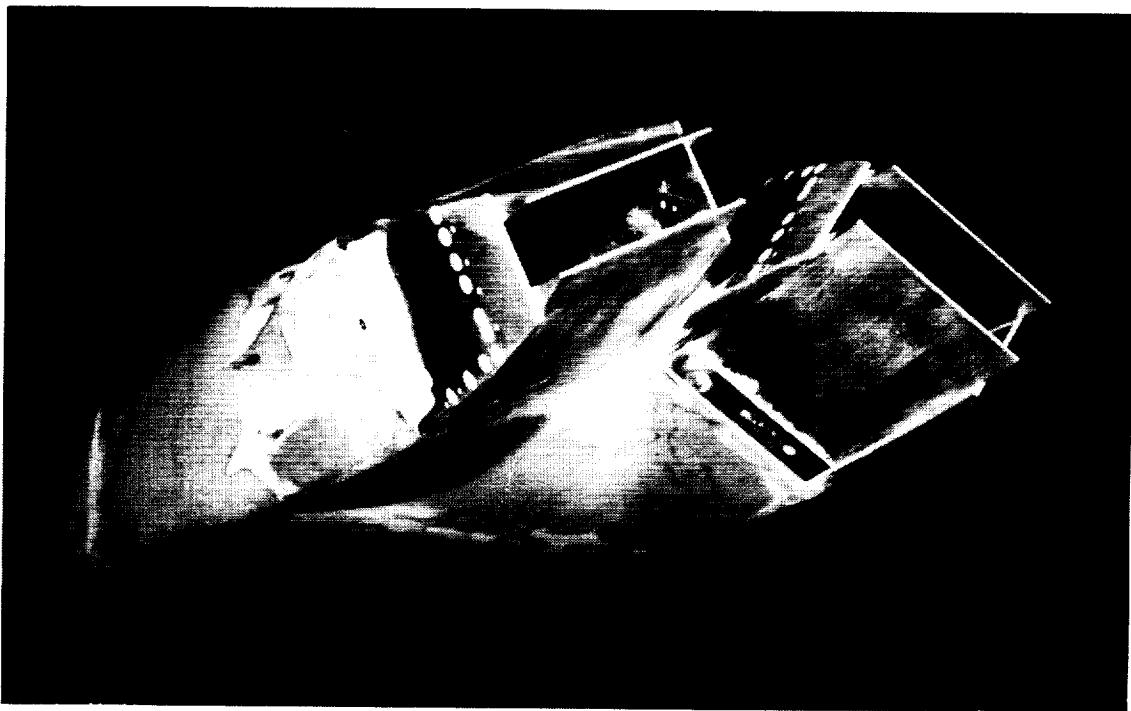
L-86-854



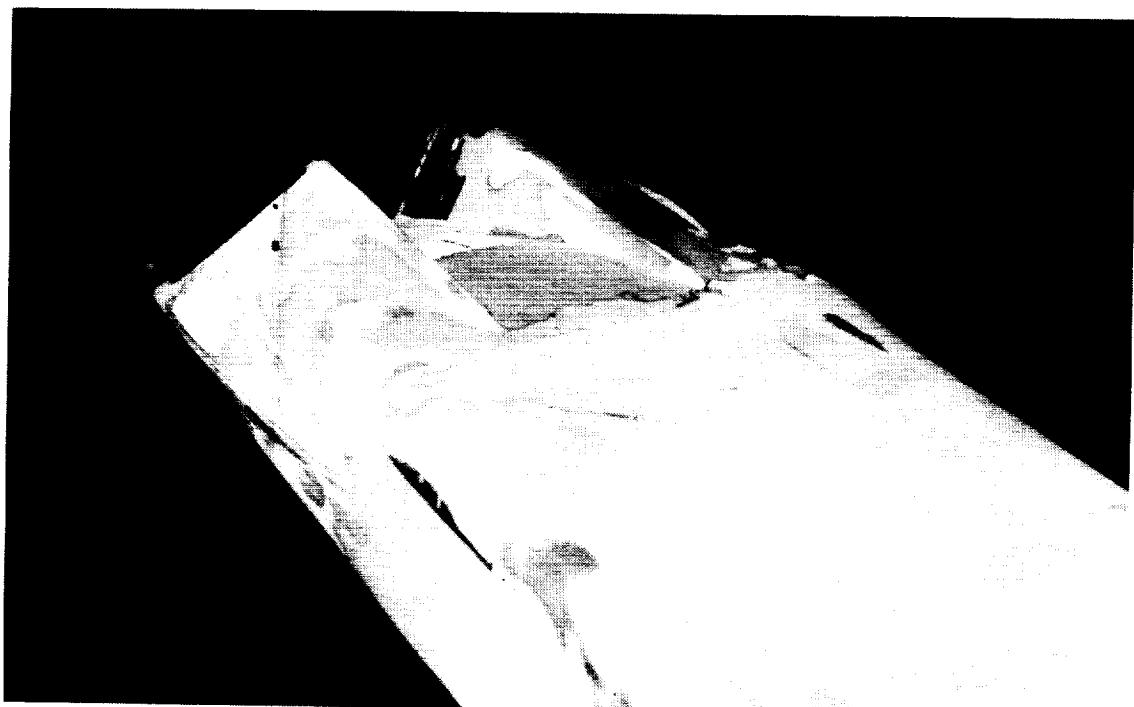
L-86-855

(b) $\theta = 30^\circ$.

Figure 3. Continued.



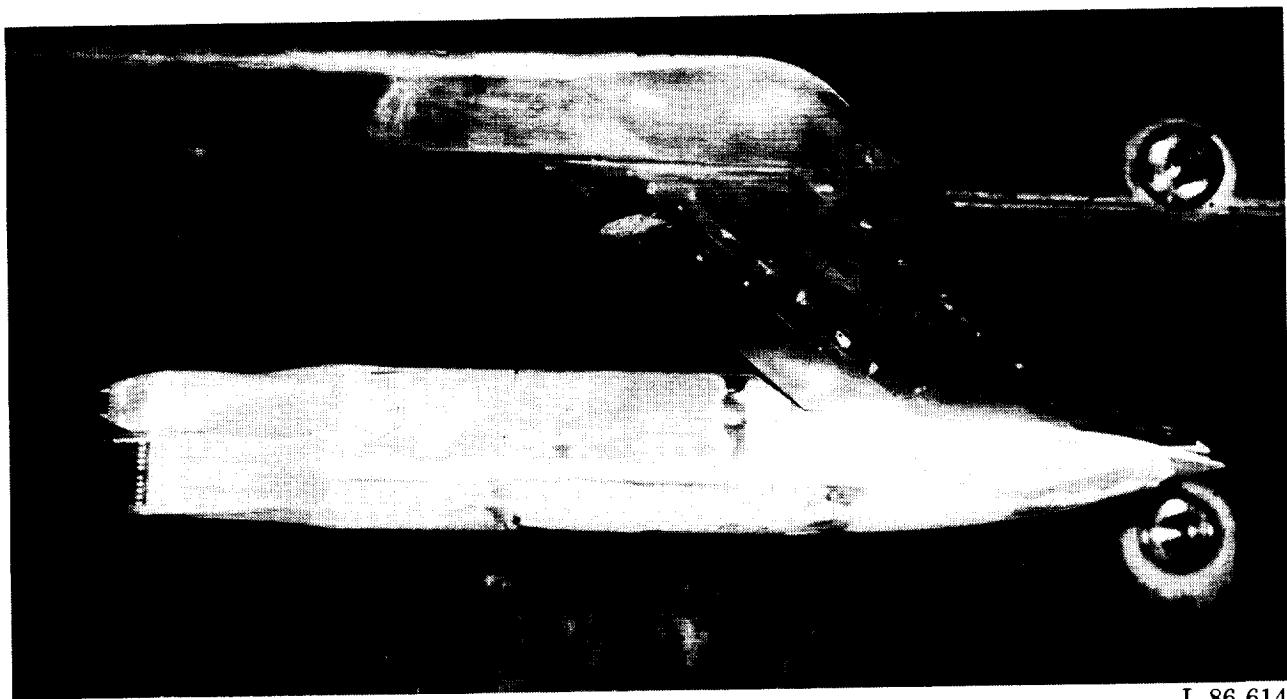
L-86-239



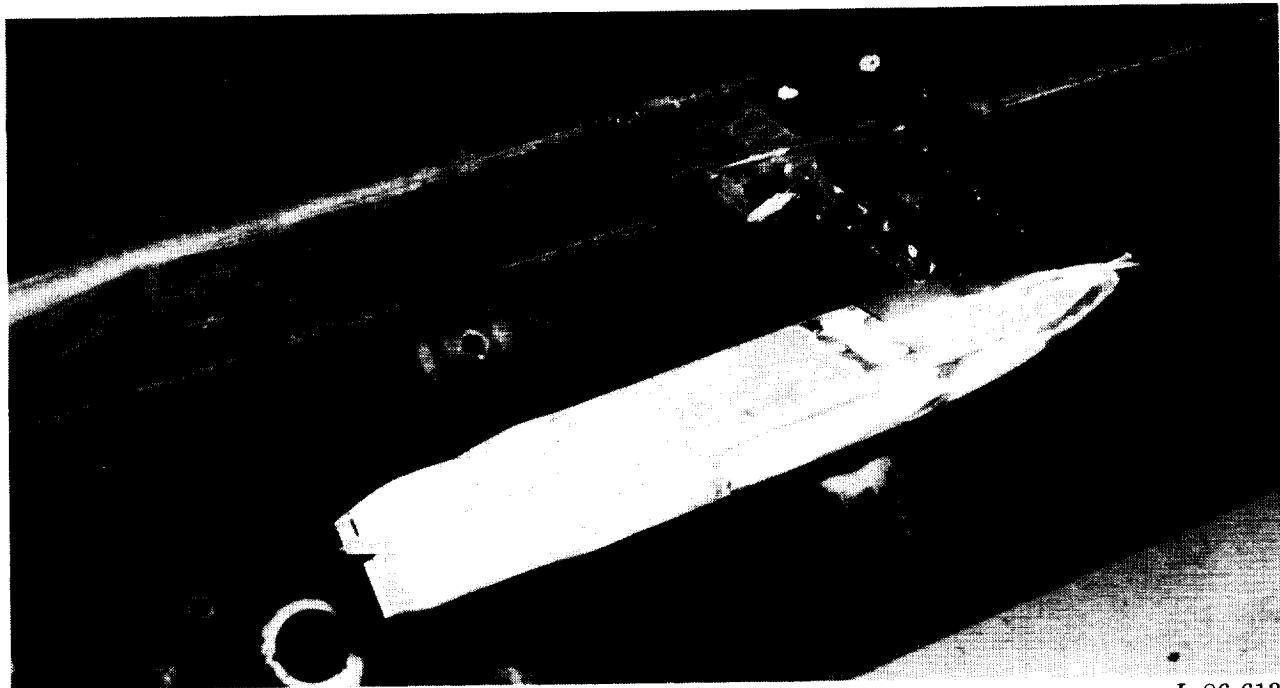
L-86-190

(c) $\theta = 30^\circ$.

Figure 3. Continued.



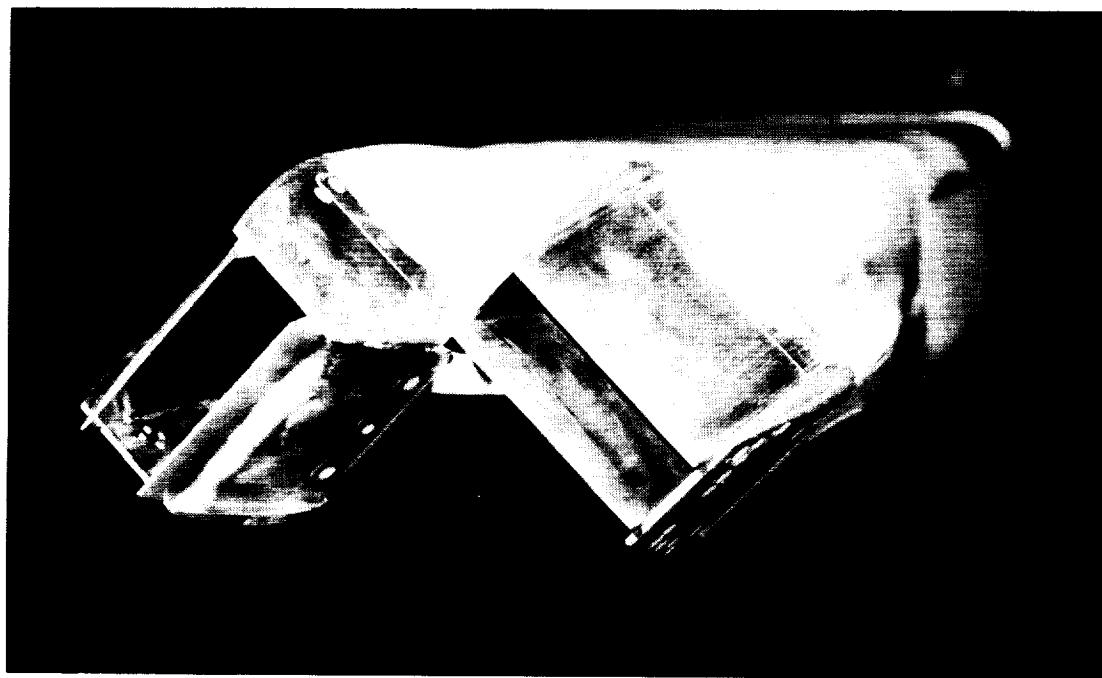
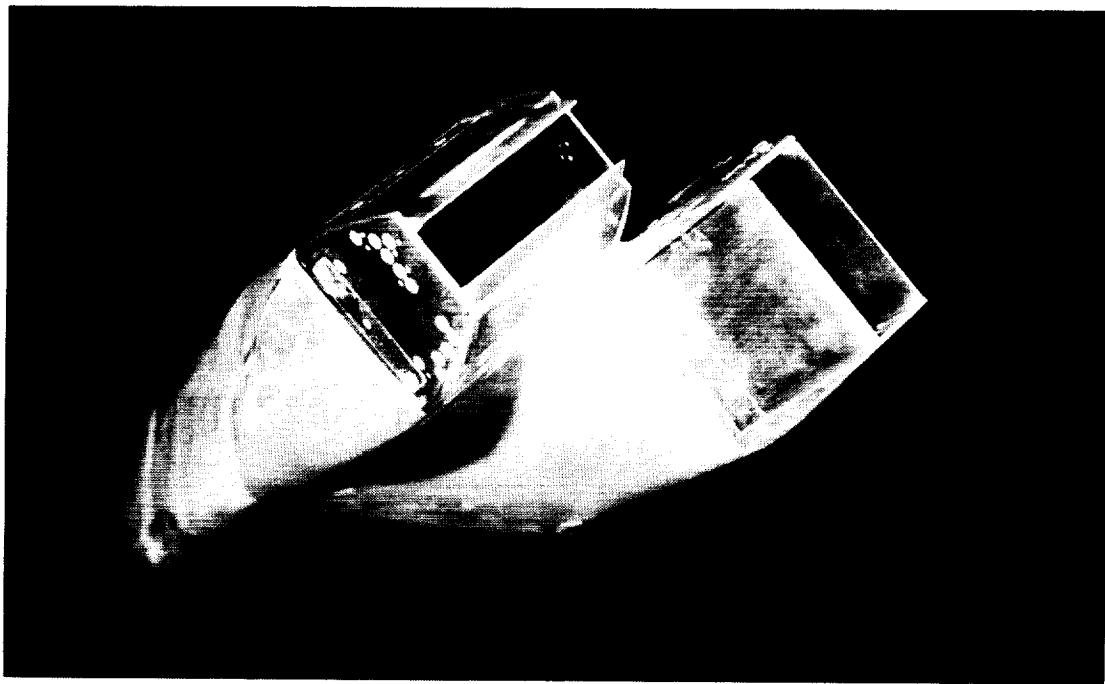
L-86-614



L-86-613

(d) $\theta = 45^\circ$.

Figure 3. Continued.



(e) $\theta = 45^\circ$.

L-91-07

Figure 3. Concluded.

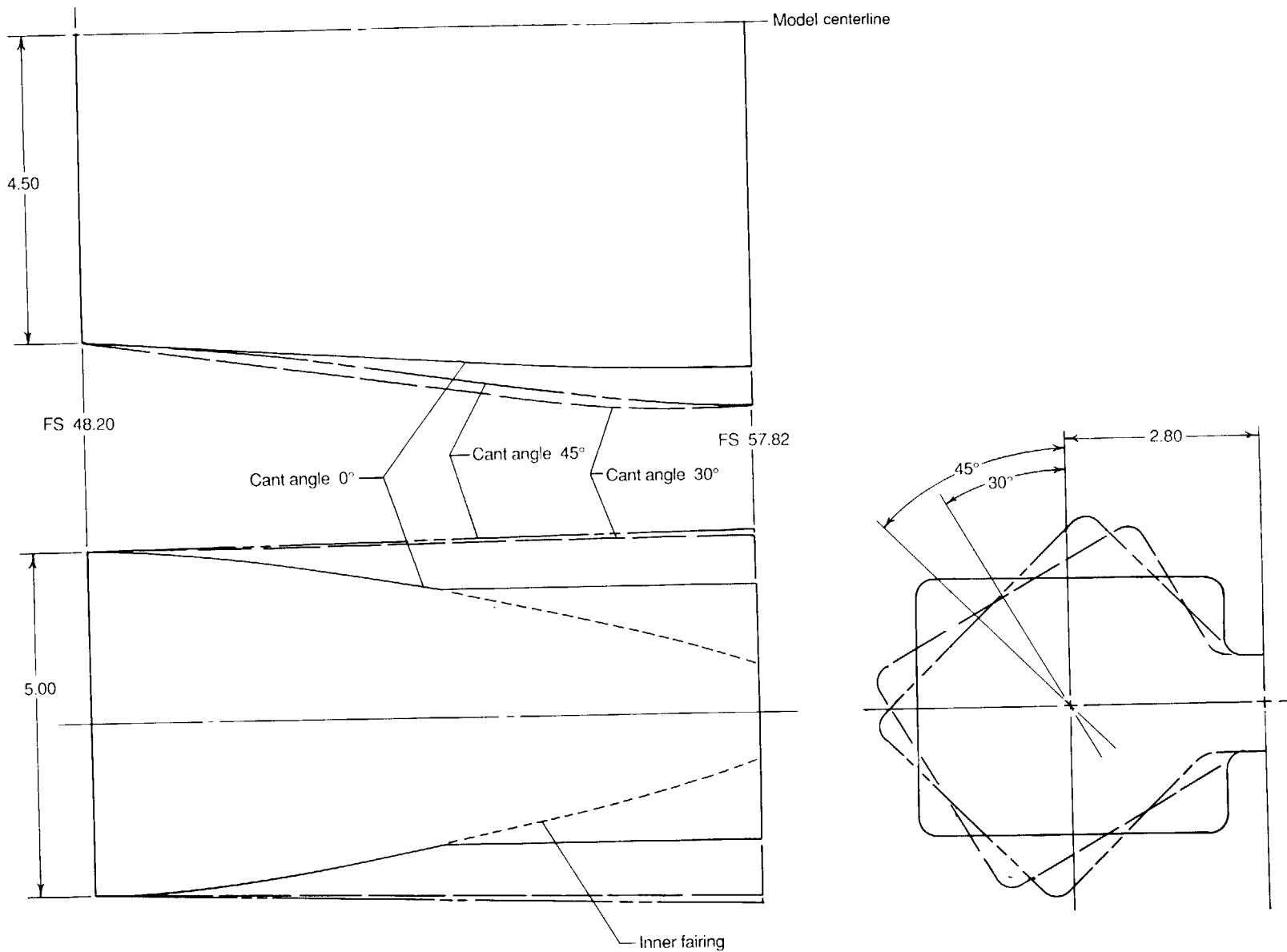


Figure 4. Sketch of various nozzle integrations. All linear dimensions in inches.

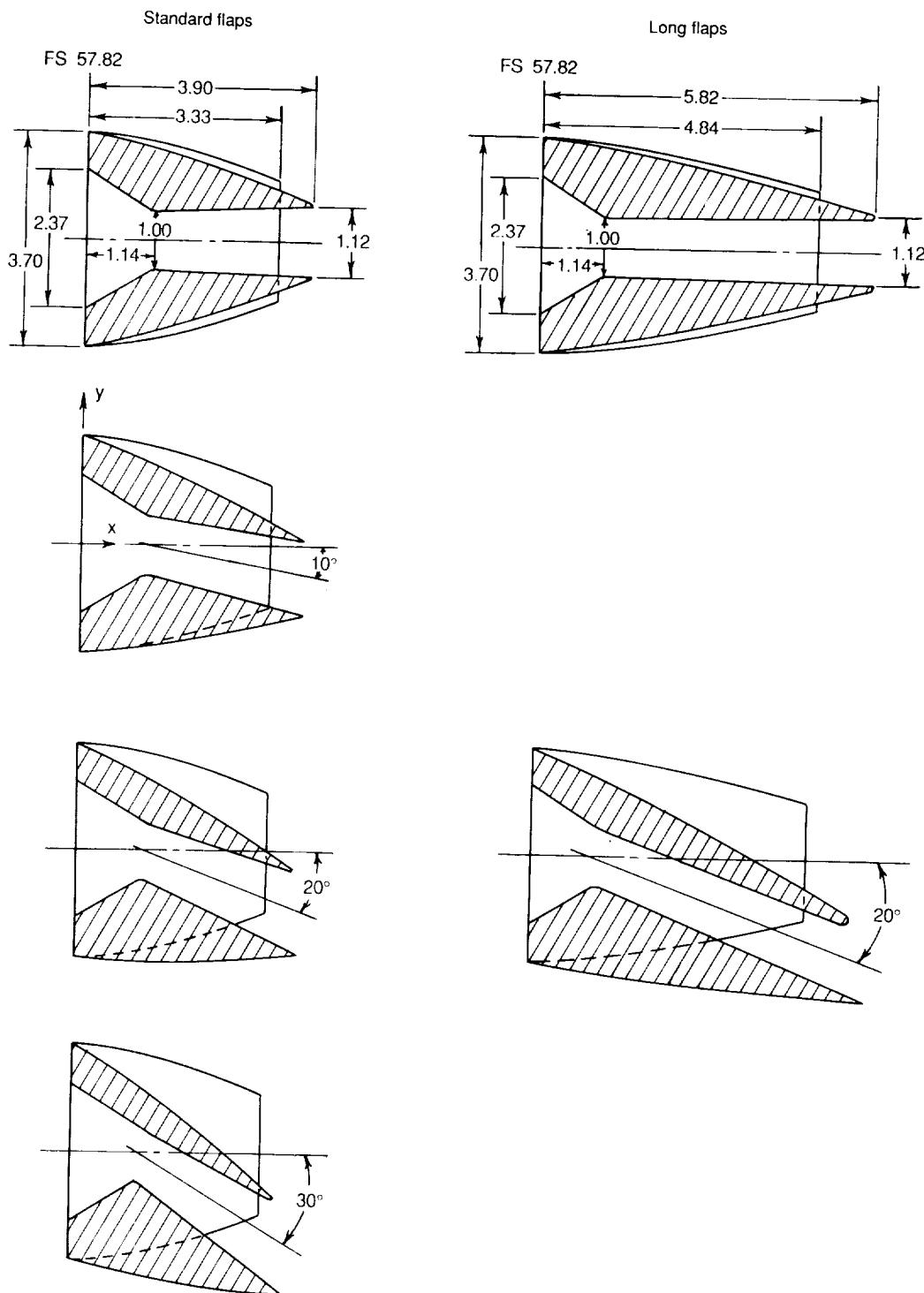
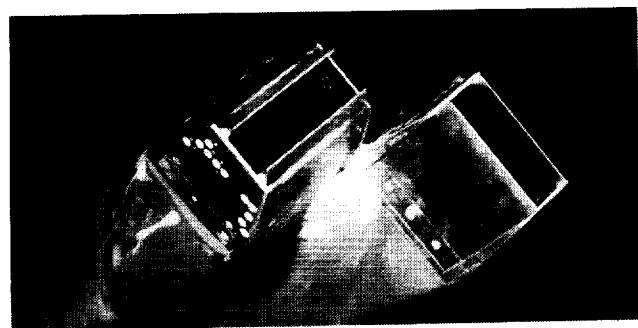
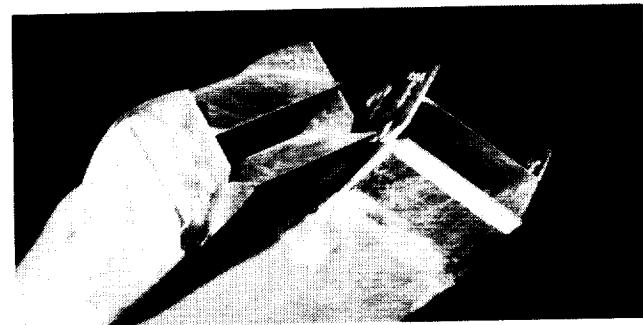


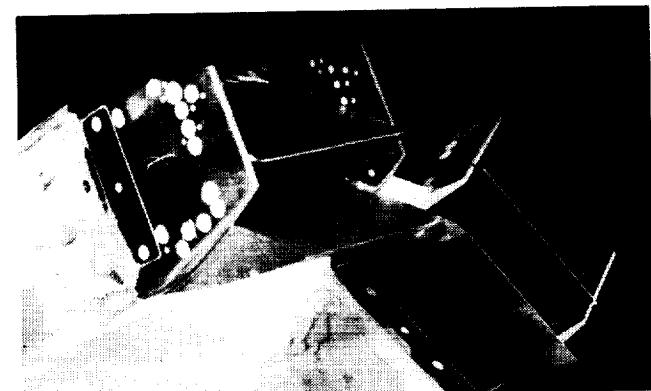
Figure 5. Nozzle geometry. Nozzle width 3.50 in. All linear dimensions in inches.



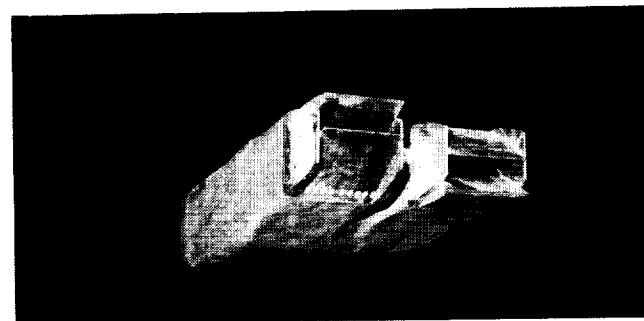
(a) $\delta_{v,p} = 0^\circ$, $\theta = 30^\circ$.



(b) $\delta_{v,p} = 20^\circ$, $\theta = 30^\circ$.



(c) $\delta_{v,p} = 30^\circ$, $\theta = 30^\circ$.

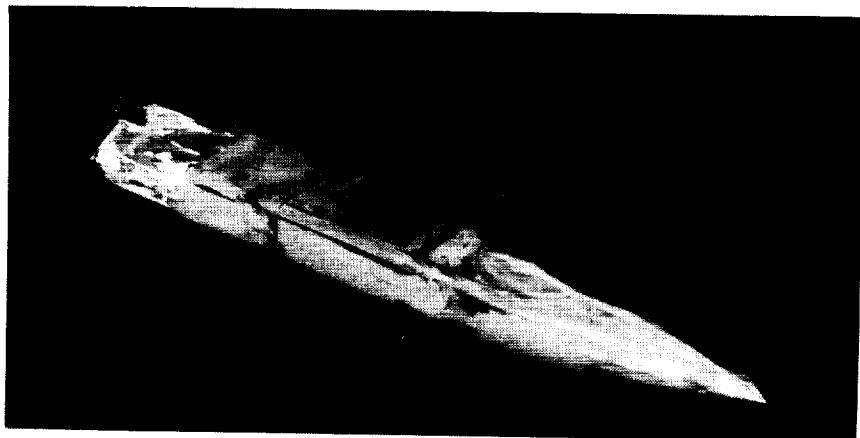


(d) $\delta_{v,p} = \pm 20^\circ$, $\theta = 0^\circ$. L-91-05

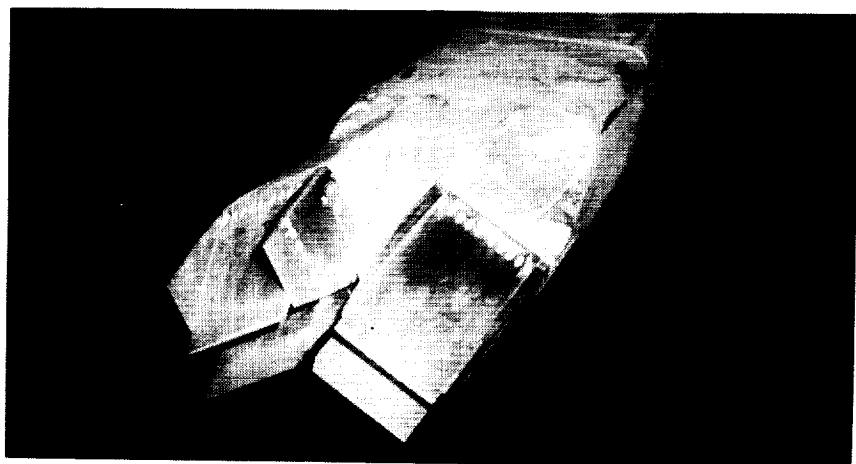
Figure 6. Nozzle with various pitch-vector angles.



(a) $\delta_{v,p} = 0^\circ$.



(b) $\delta_{v,p} = 0^\circ$.



(c) $\delta_{v,p} = 20^\circ$.

L-91-06

Figure 7. Nozzle with long divergent flaps, $\theta = 30^\circ$.

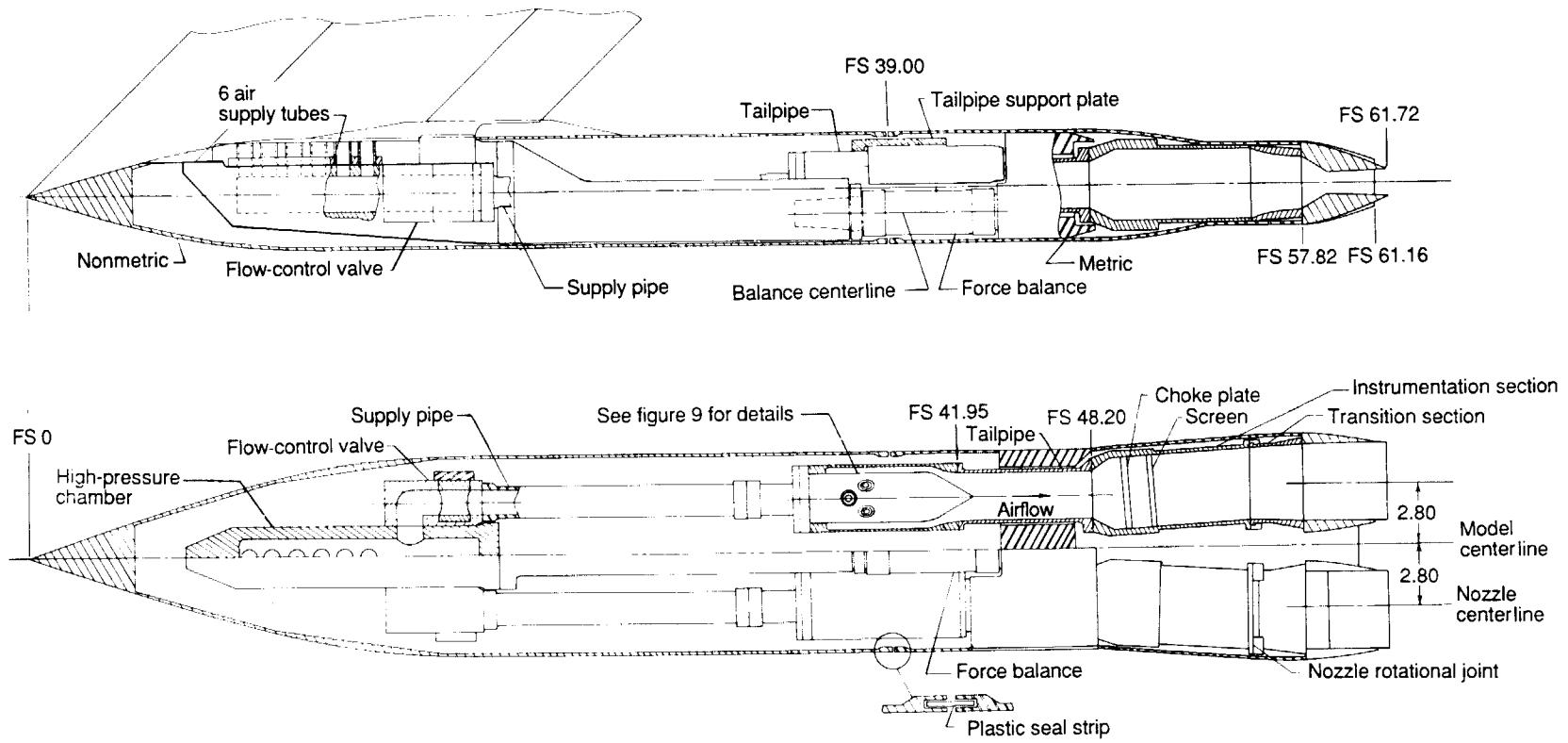


Figure 8. Twin-jet propulsion simulation system with nozzles at 0° cant. All linear dimensions in inches.

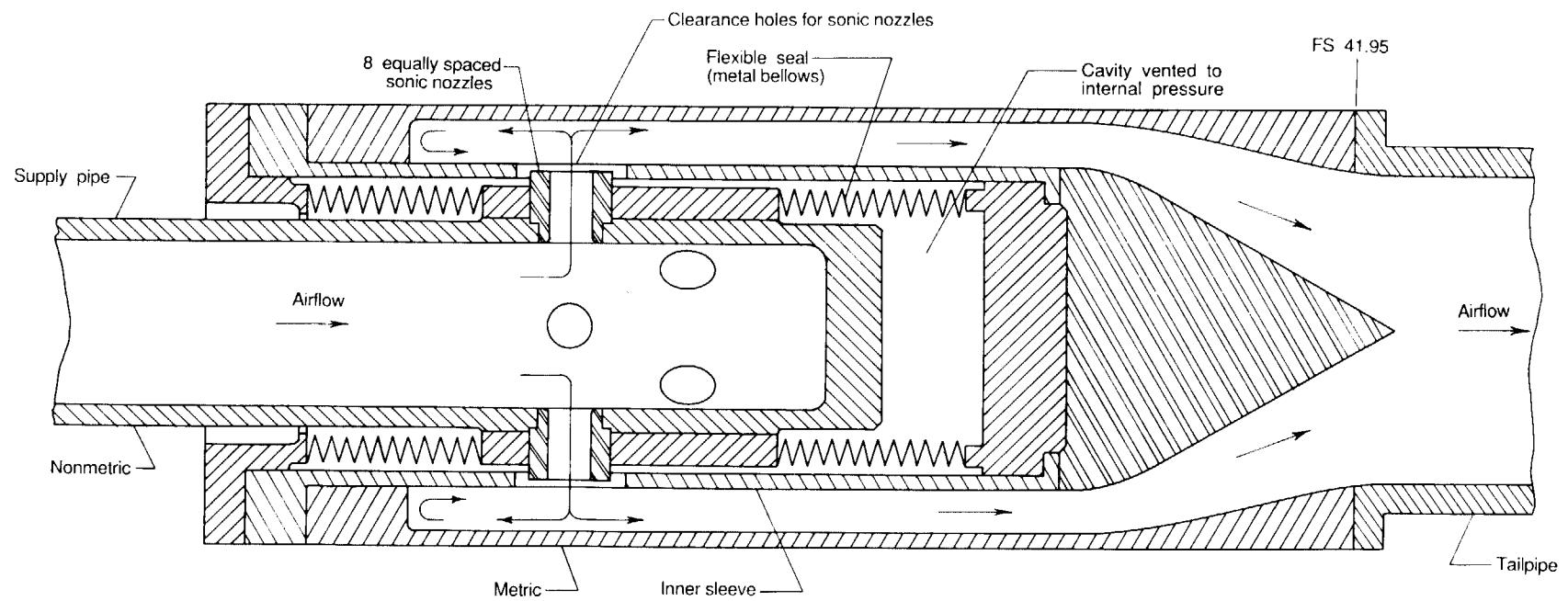


Figure 9. Details of bellows arrangement used to transfer air from nonmetric to metric portions of model.

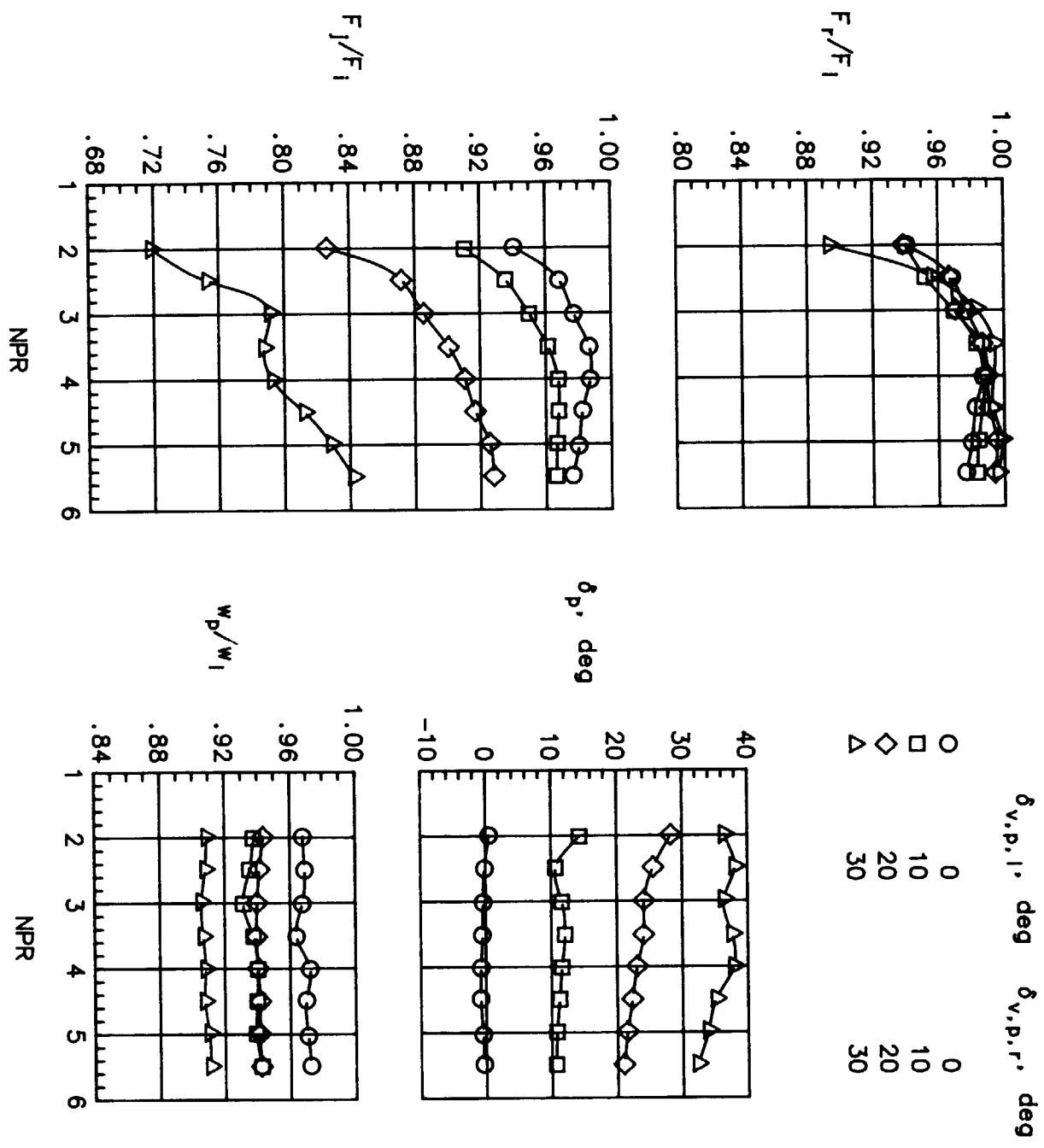
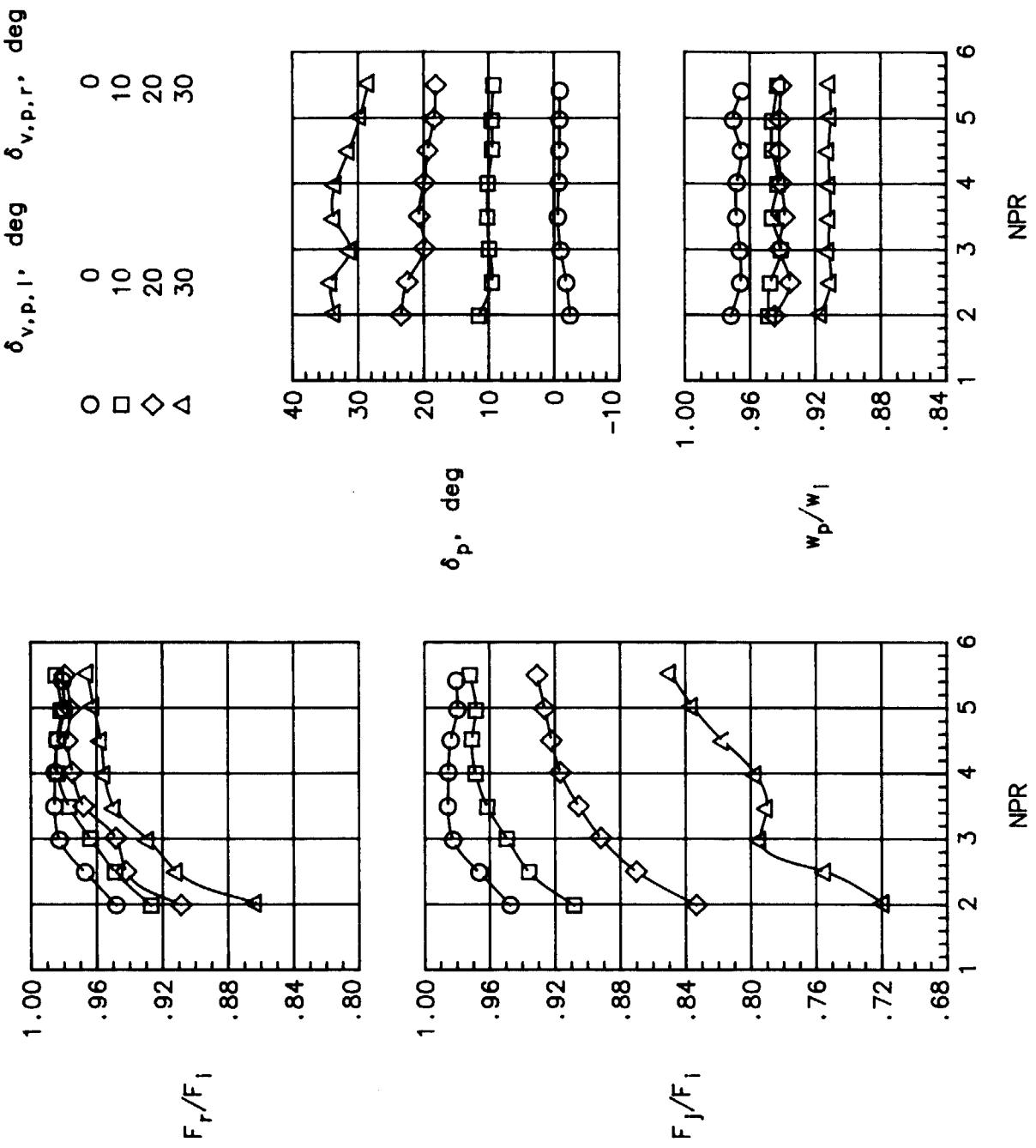
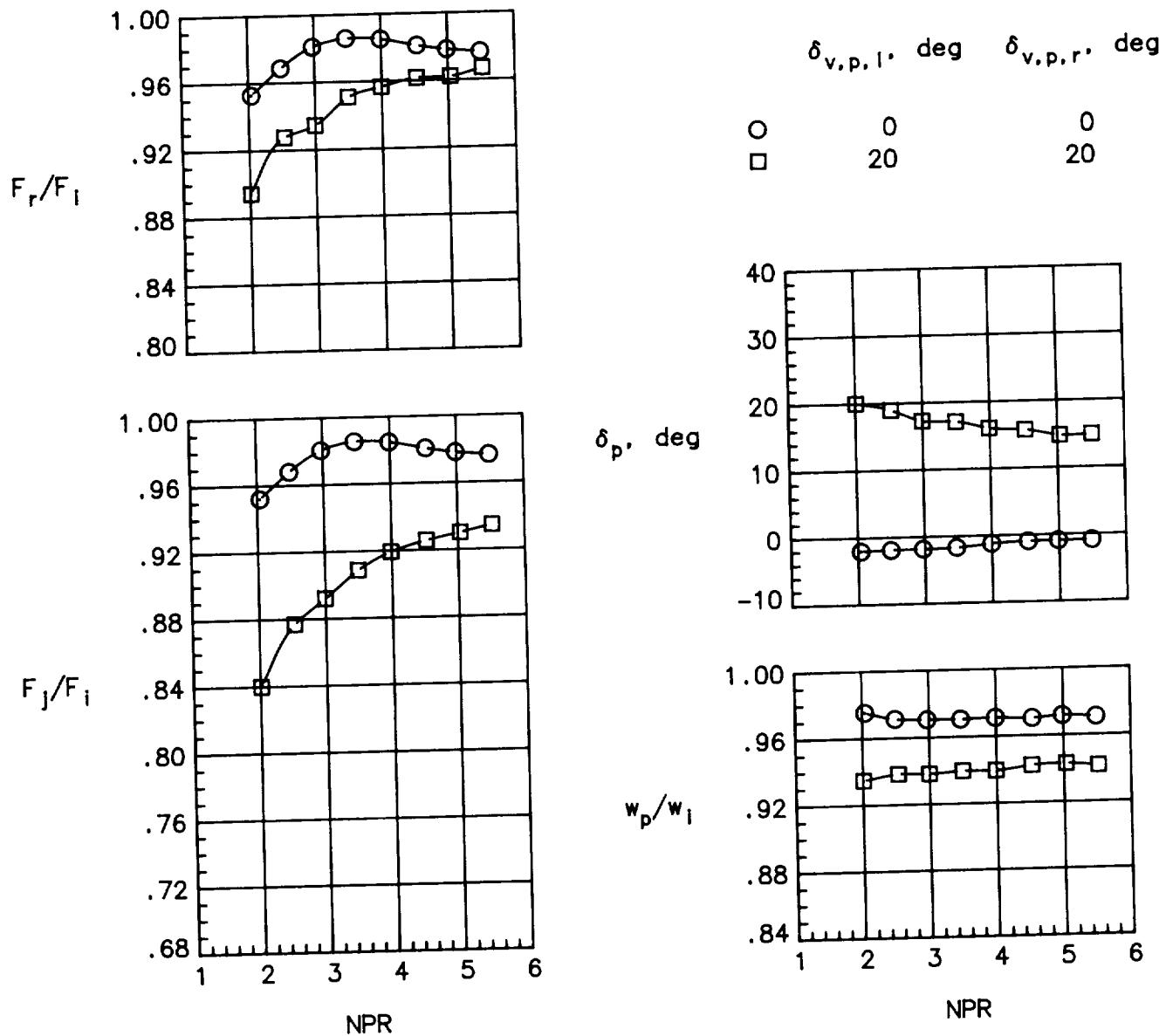


Figure 10. Effect of symmetric pitch vectoring on nozzle static performance for standard flaps.



(b) $\theta = 30^\circ$.

Figure 10. Continued.



(c) $\theta = 45^\circ$.

Figure 10. Concluded.

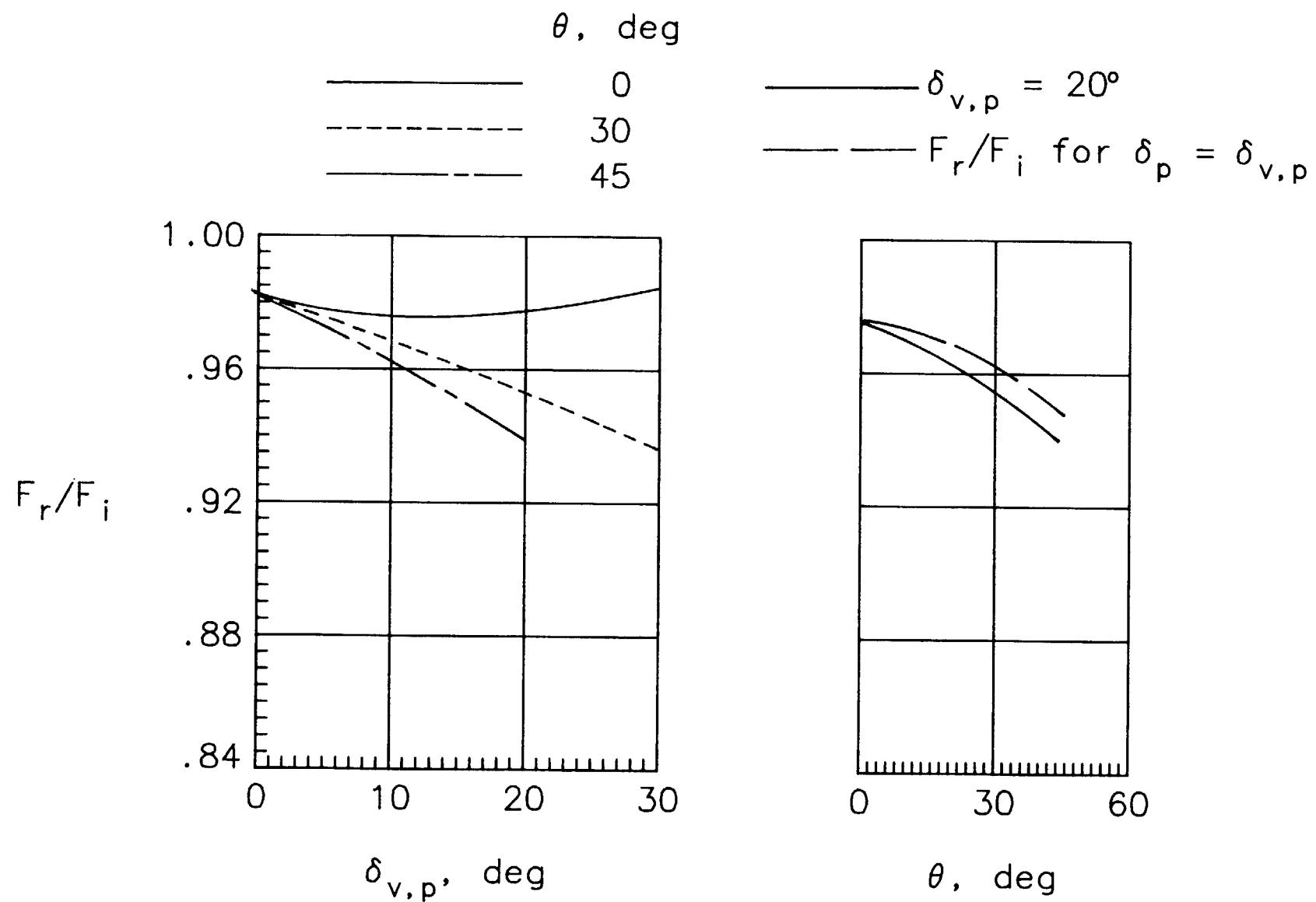


Figure 11. Resultant thrust ratios. Standard flaps; $M = 0$; NPR = 3.2.

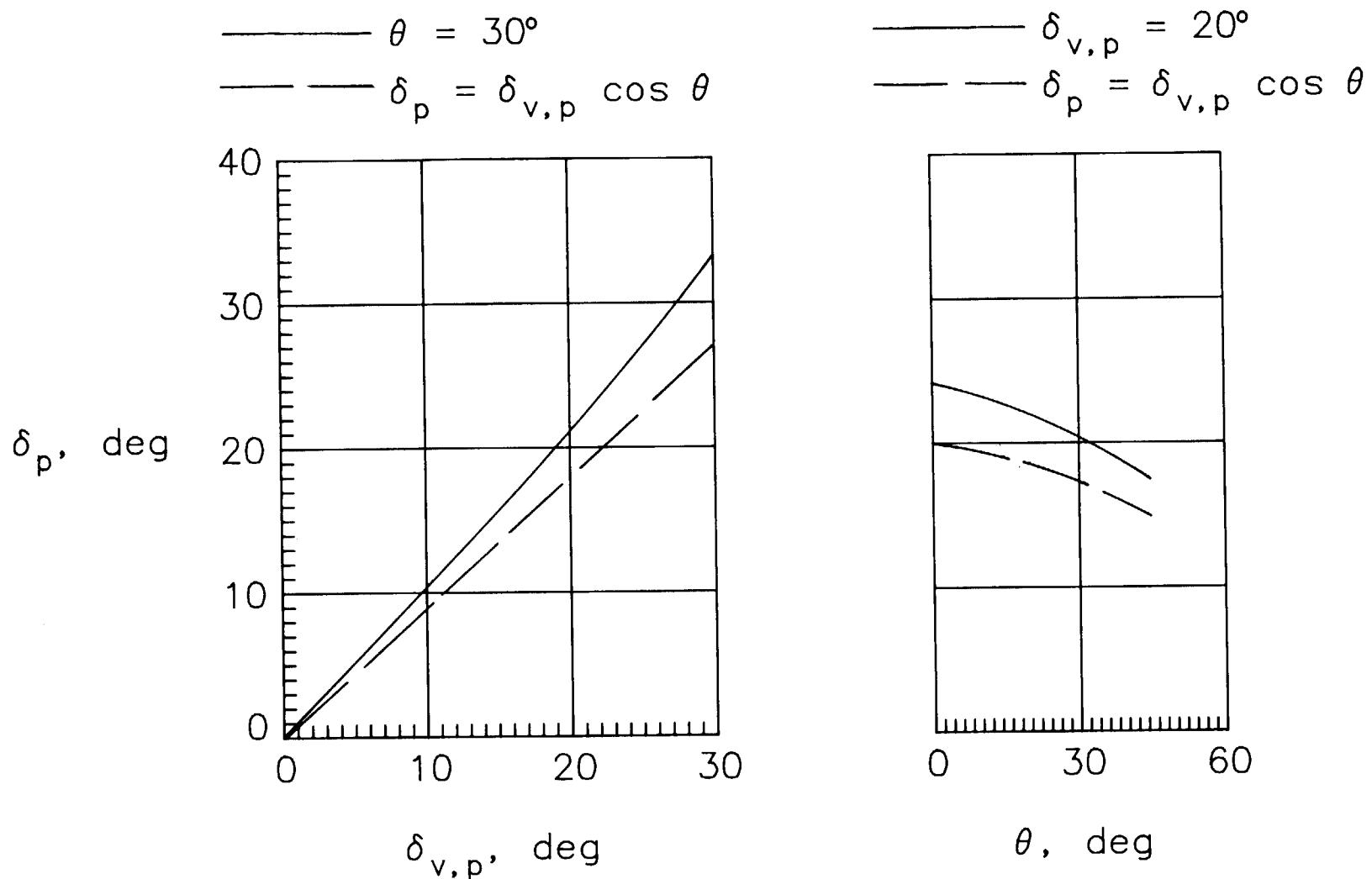


Figure 12. Resultant pitch-vector angles. $M = 0$; $NPR = 3.2$.

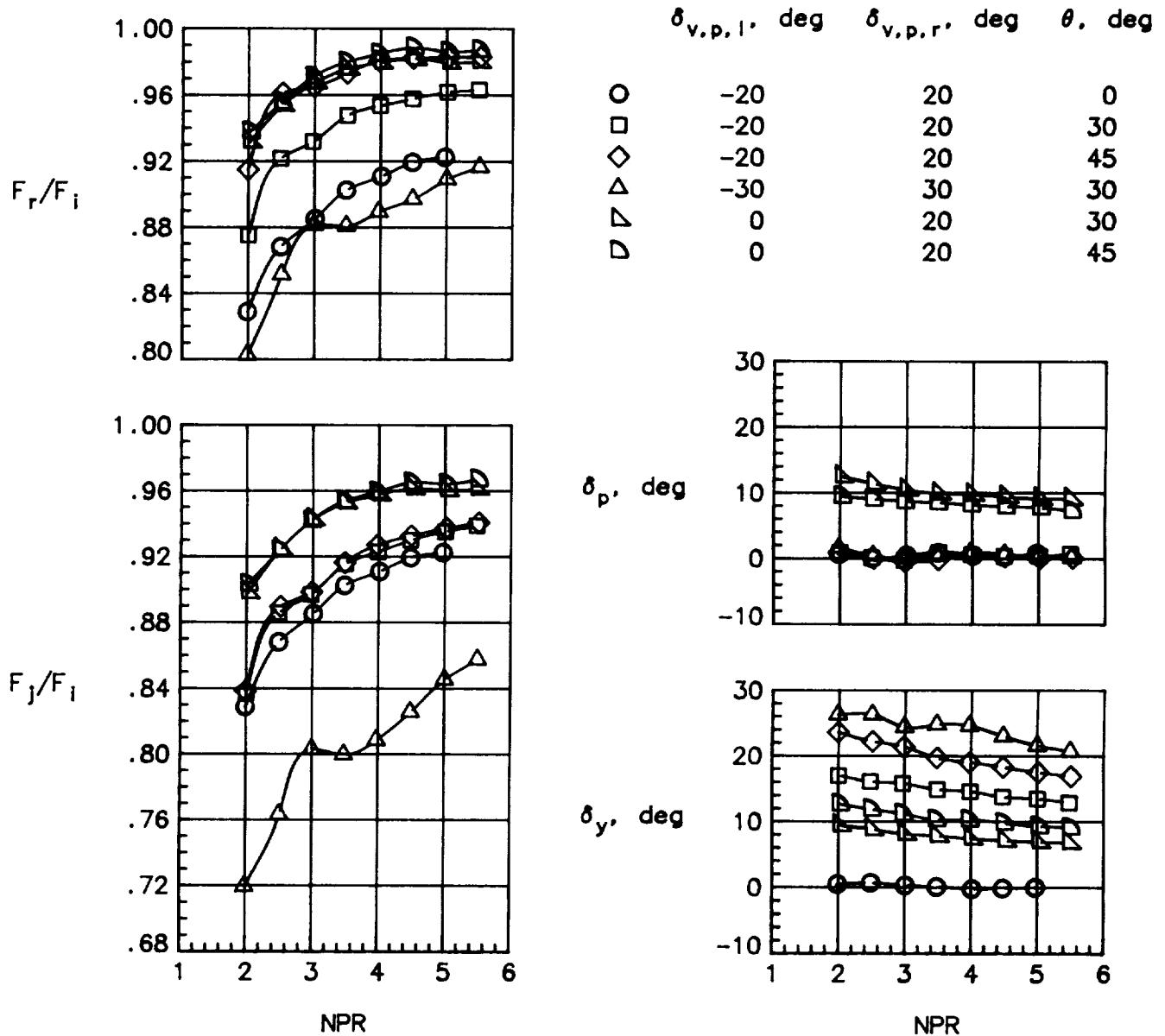


Figure 13. Effect of differential pitch vectoring on nozzle static performance for standard flaps.

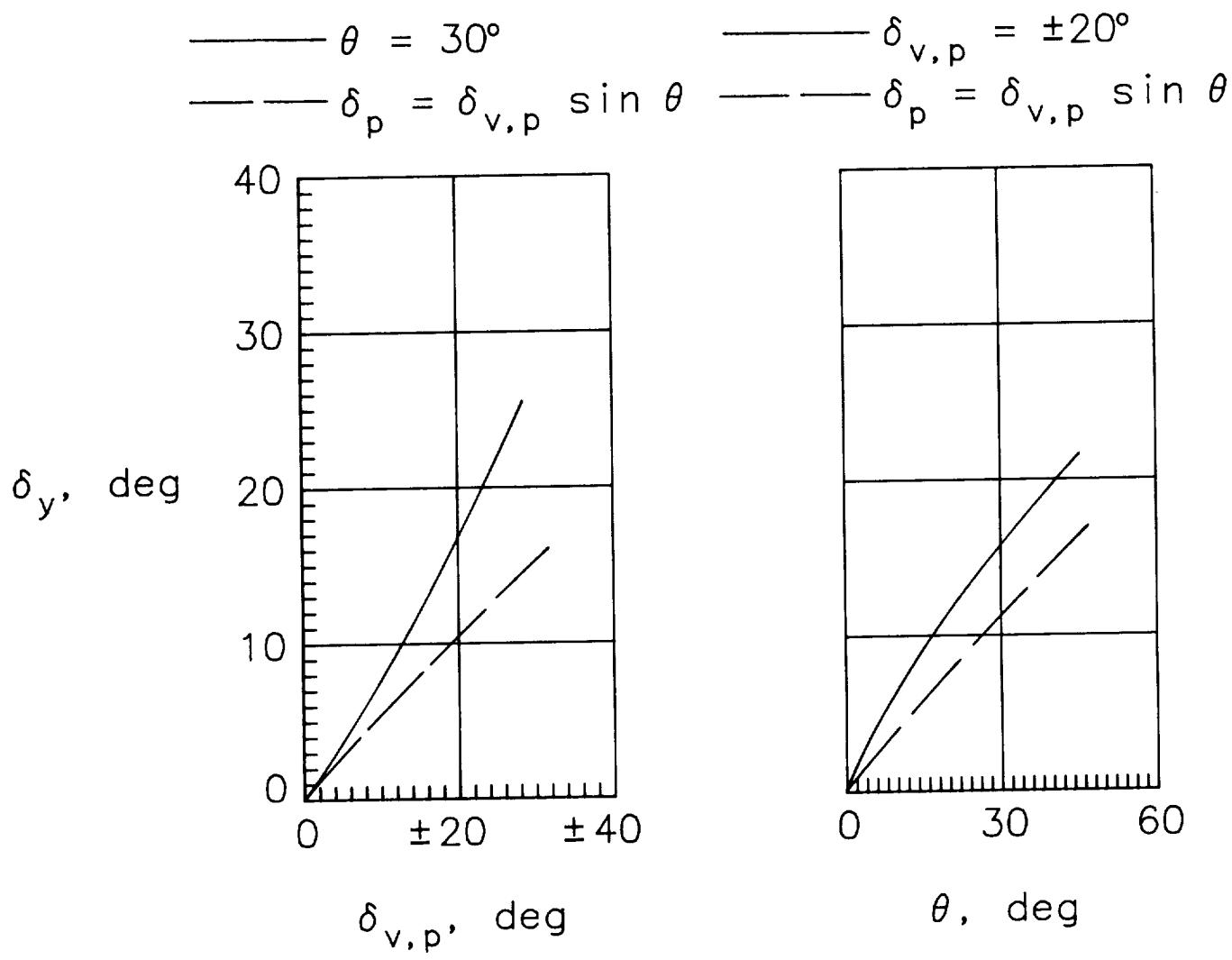


Figure 14. Resultant yaw-vector angles. $M = 0$; $NPR = 3.2$.

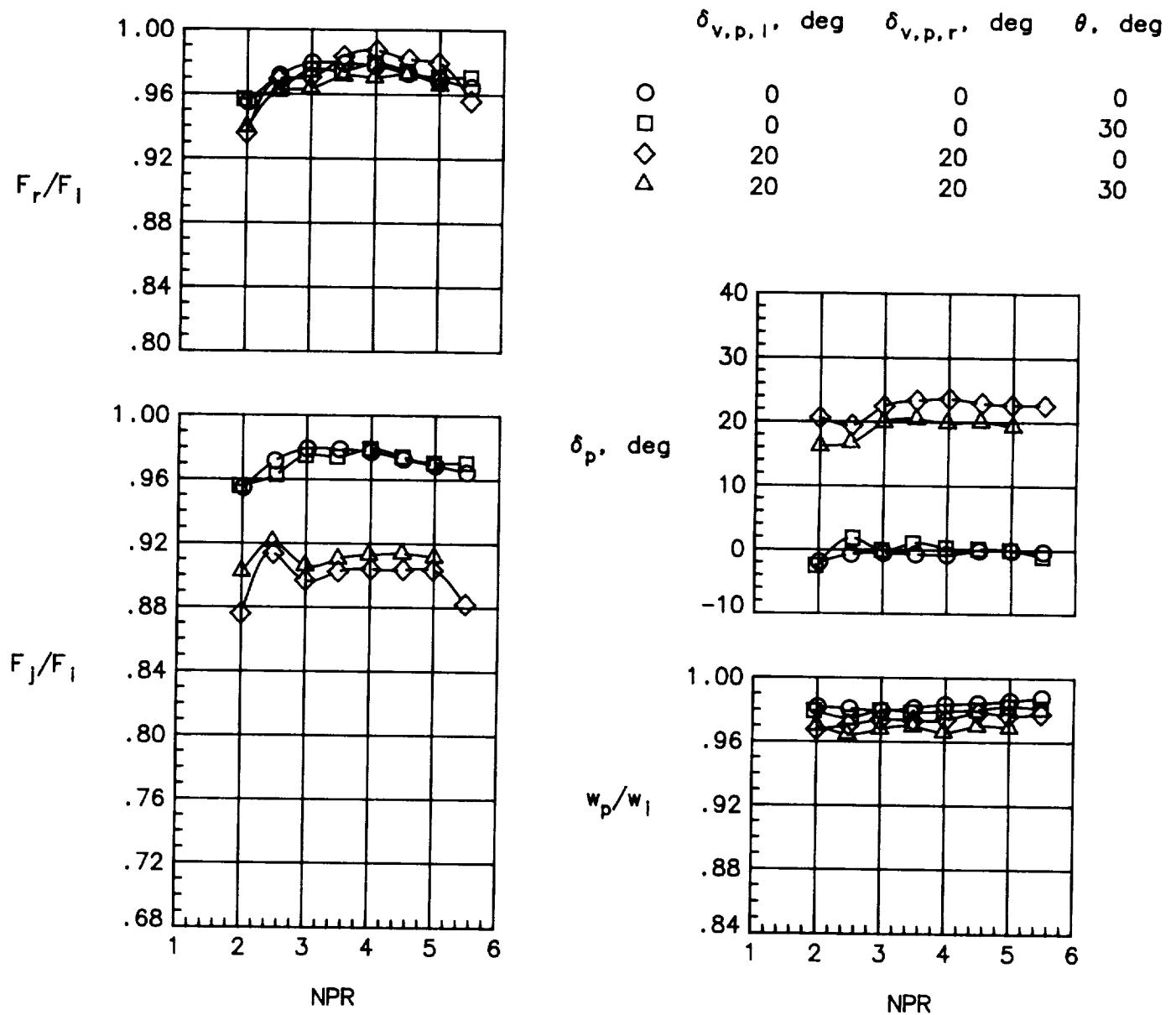


Figure 15. Effect of symmetric pitch vectoring and cant angle on nozzle static performance for long flaps.

$\delta_{v,p,l}$, deg $\delta_{v,p,r}$, deg Flaps

○	0	0	Standard
□	0	0	Long
◇	20	20	Standard
△	20	20	Long

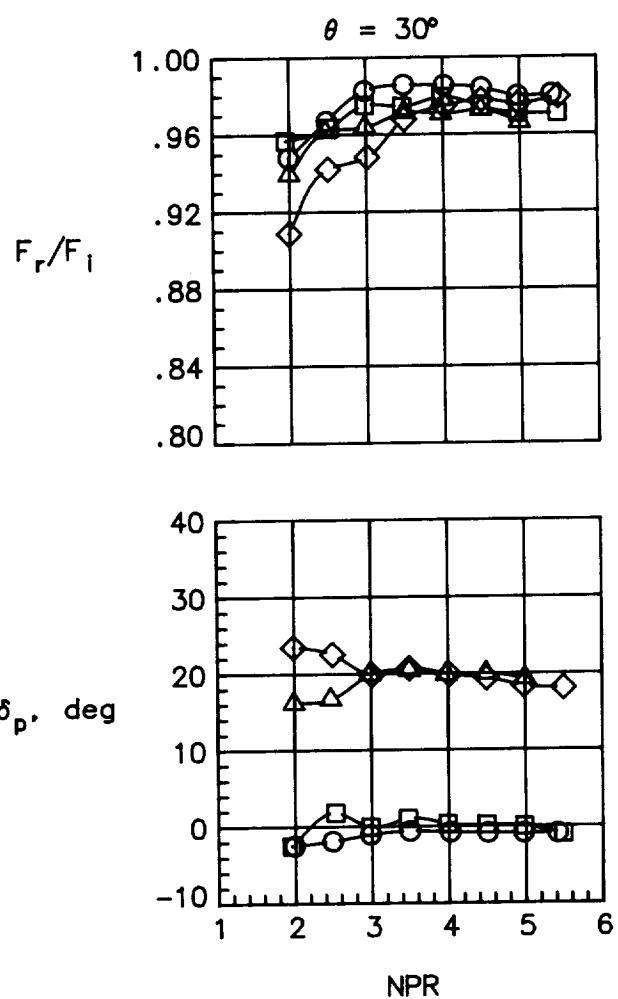
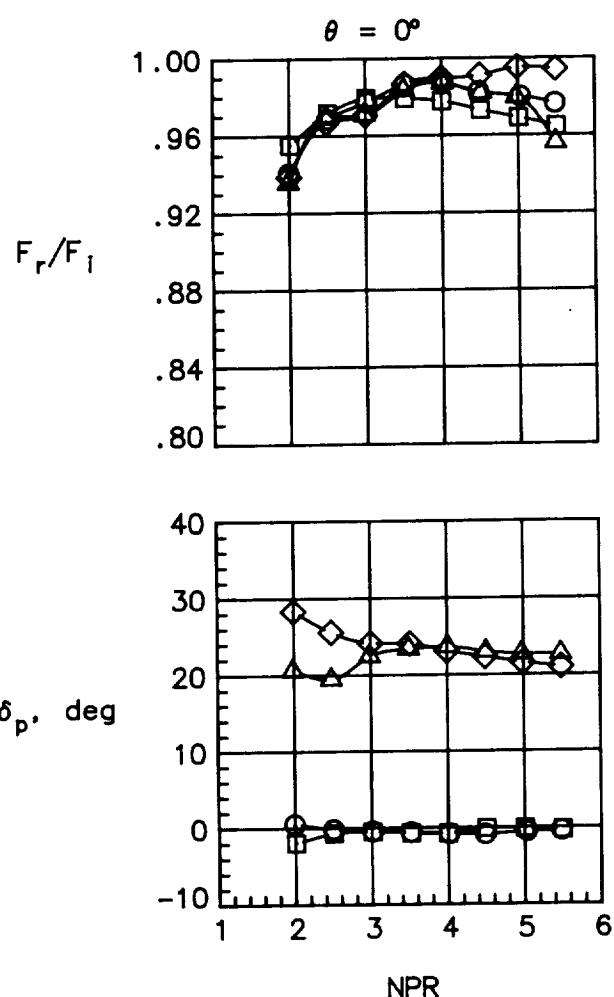
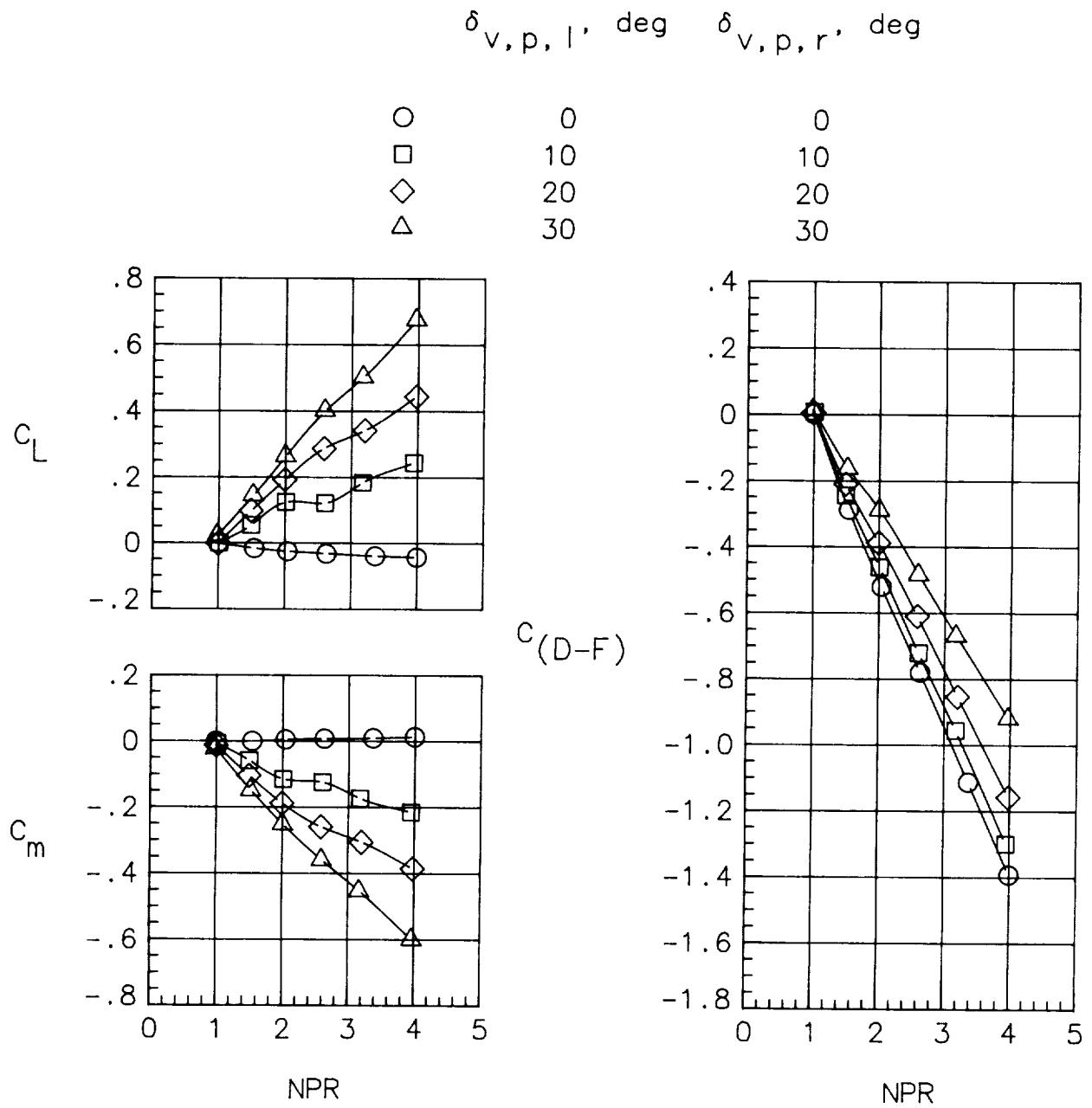


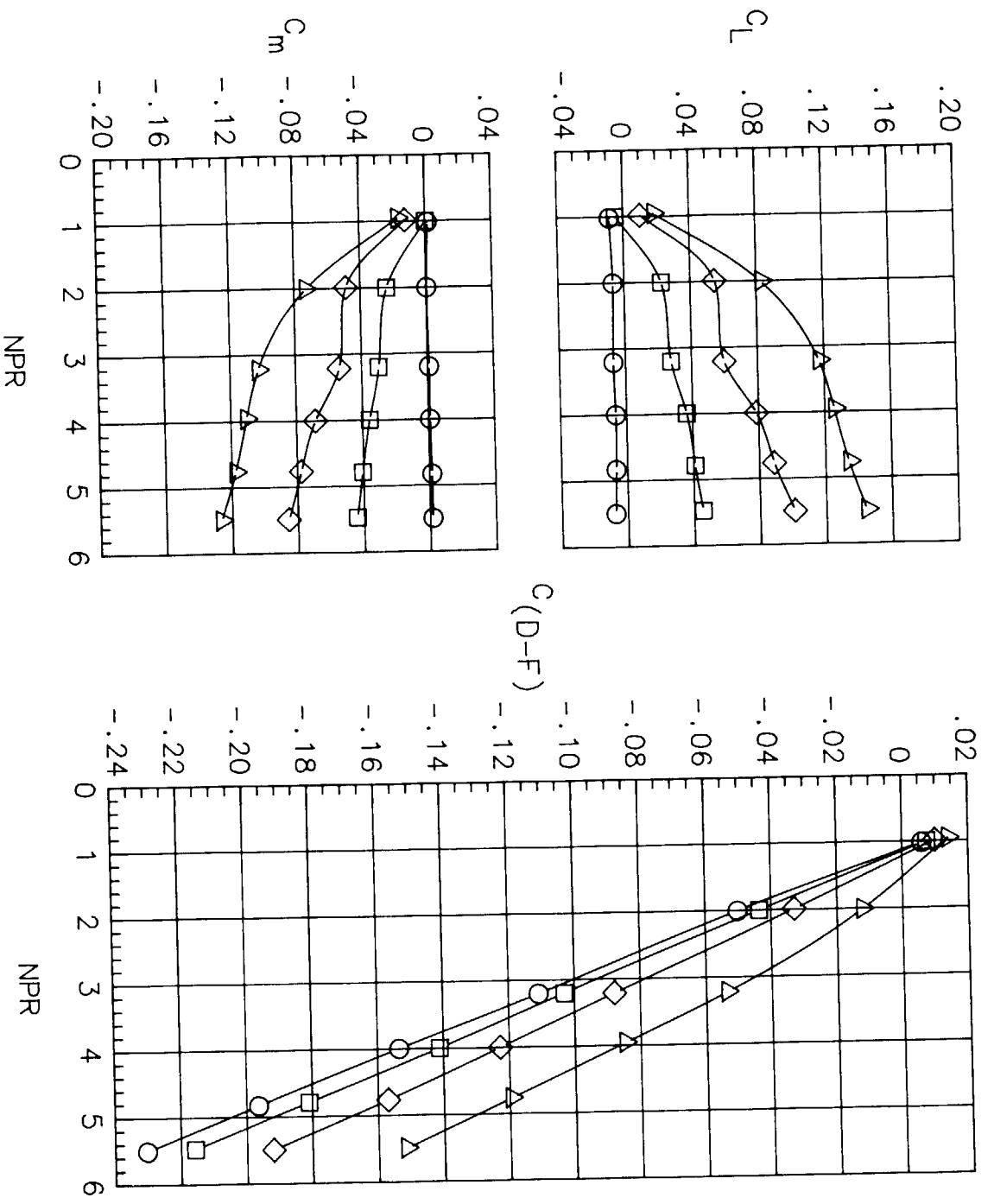
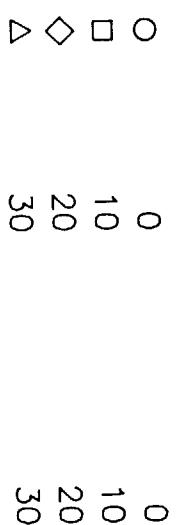
Figure 16. Effect of nozzle flap length on nozzle static performance.



(a) $M = 0.20$.

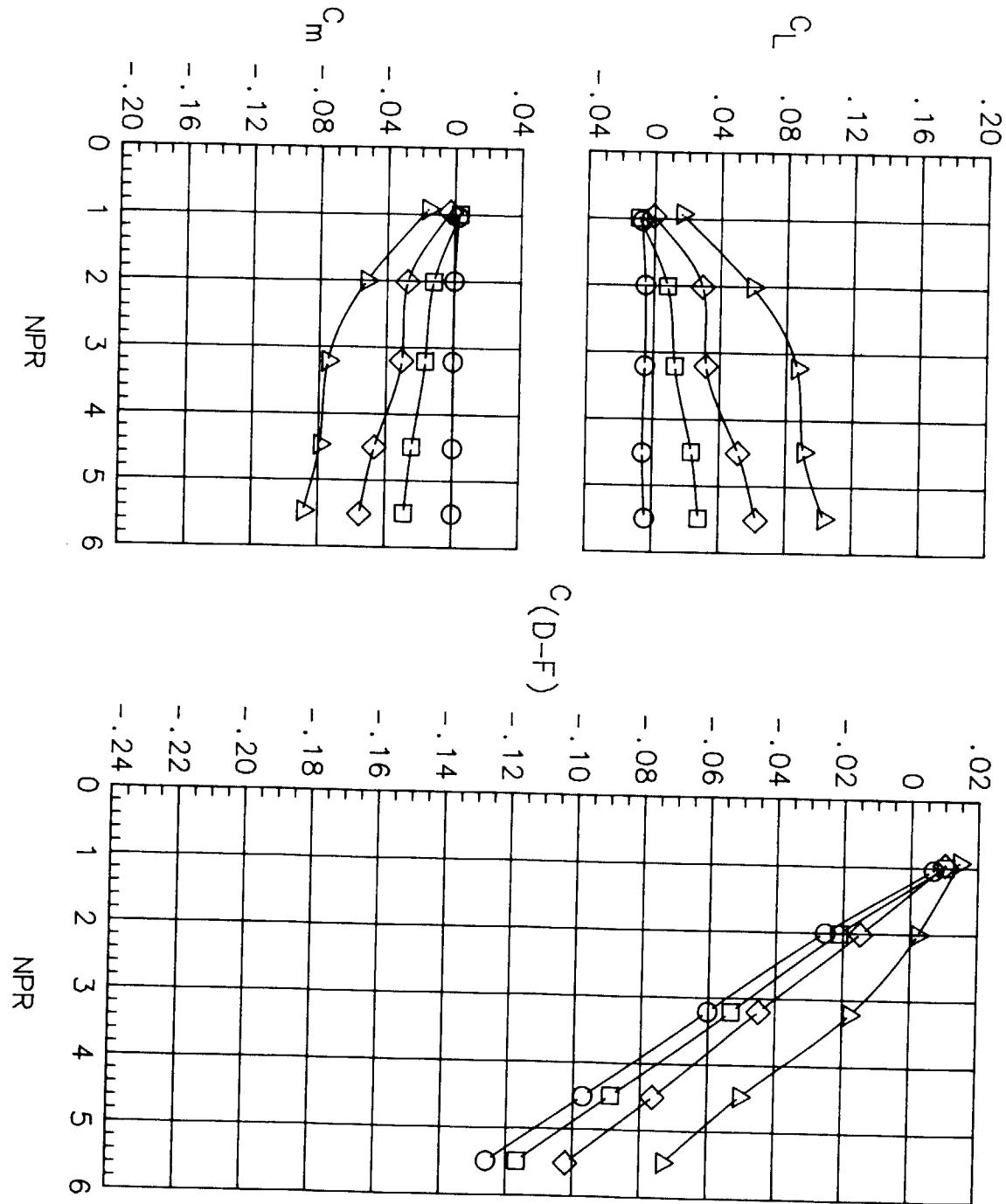
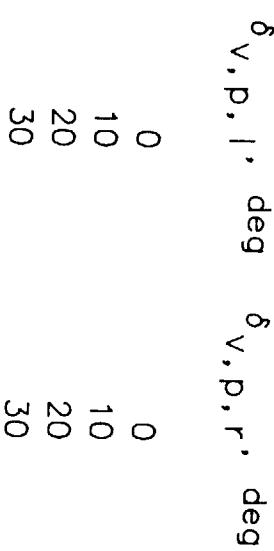
Figure 17. Effect of symmetric nozzle pitch vectoring on total longitudinal aerodynamic characteristics for standard flaps with $\theta = 30^\circ$ and $\alpha = 0^\circ$.

$\delta_{v,p,l}$, deg $\delta_{v,p,r}$, deg



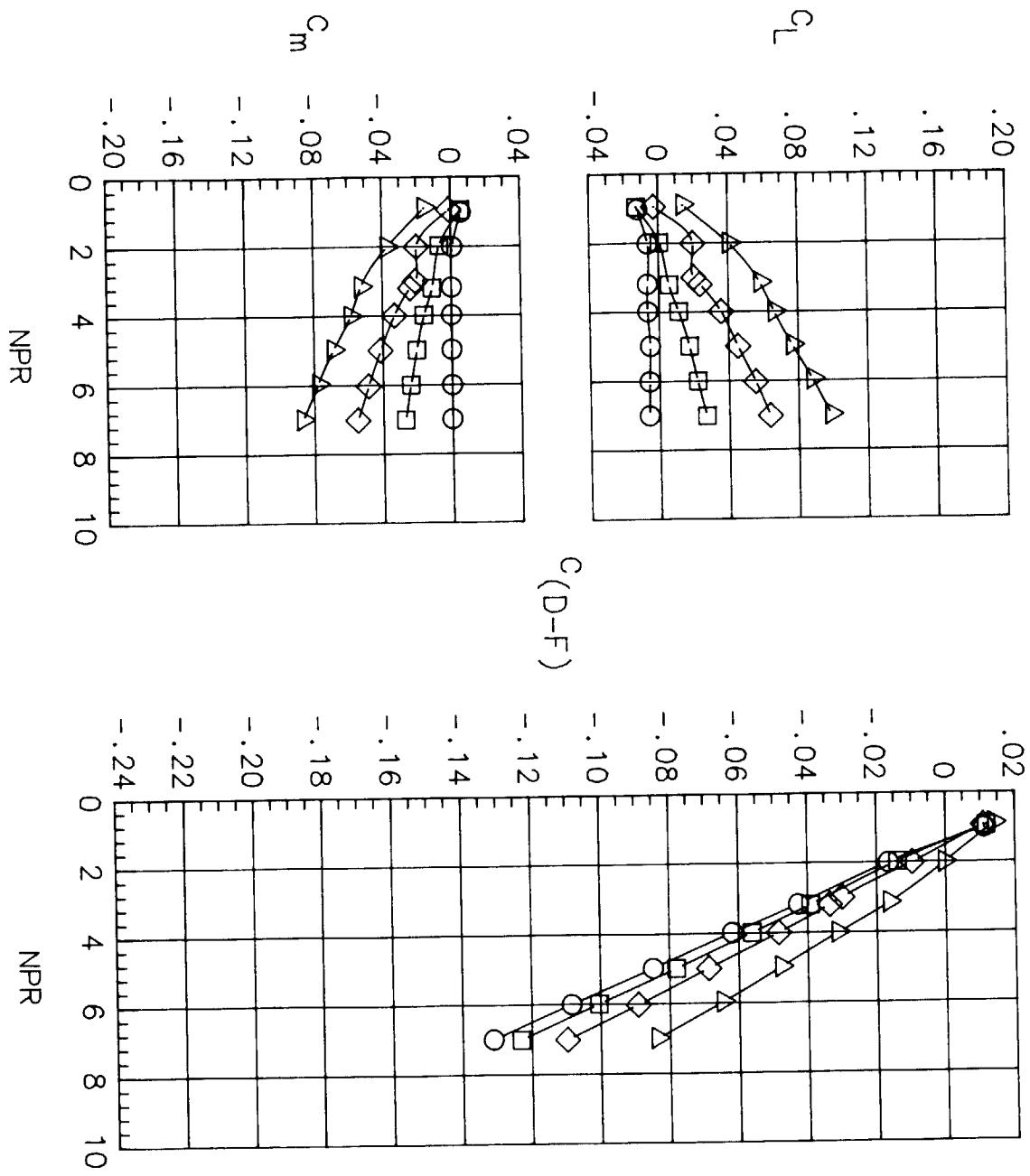
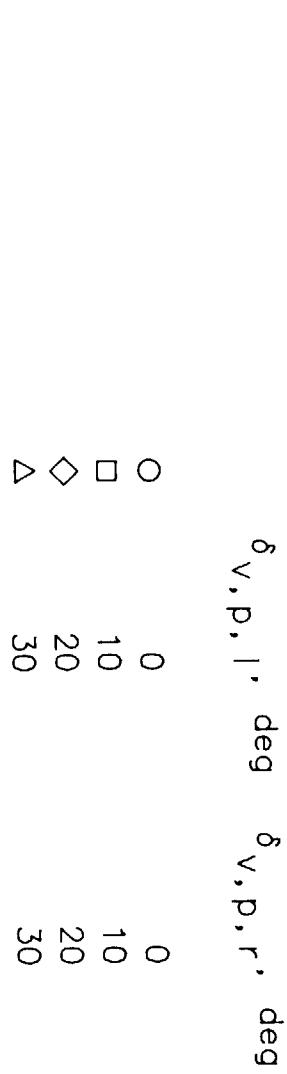
(b) $M = 0.60$.

Figure 17. Continued.



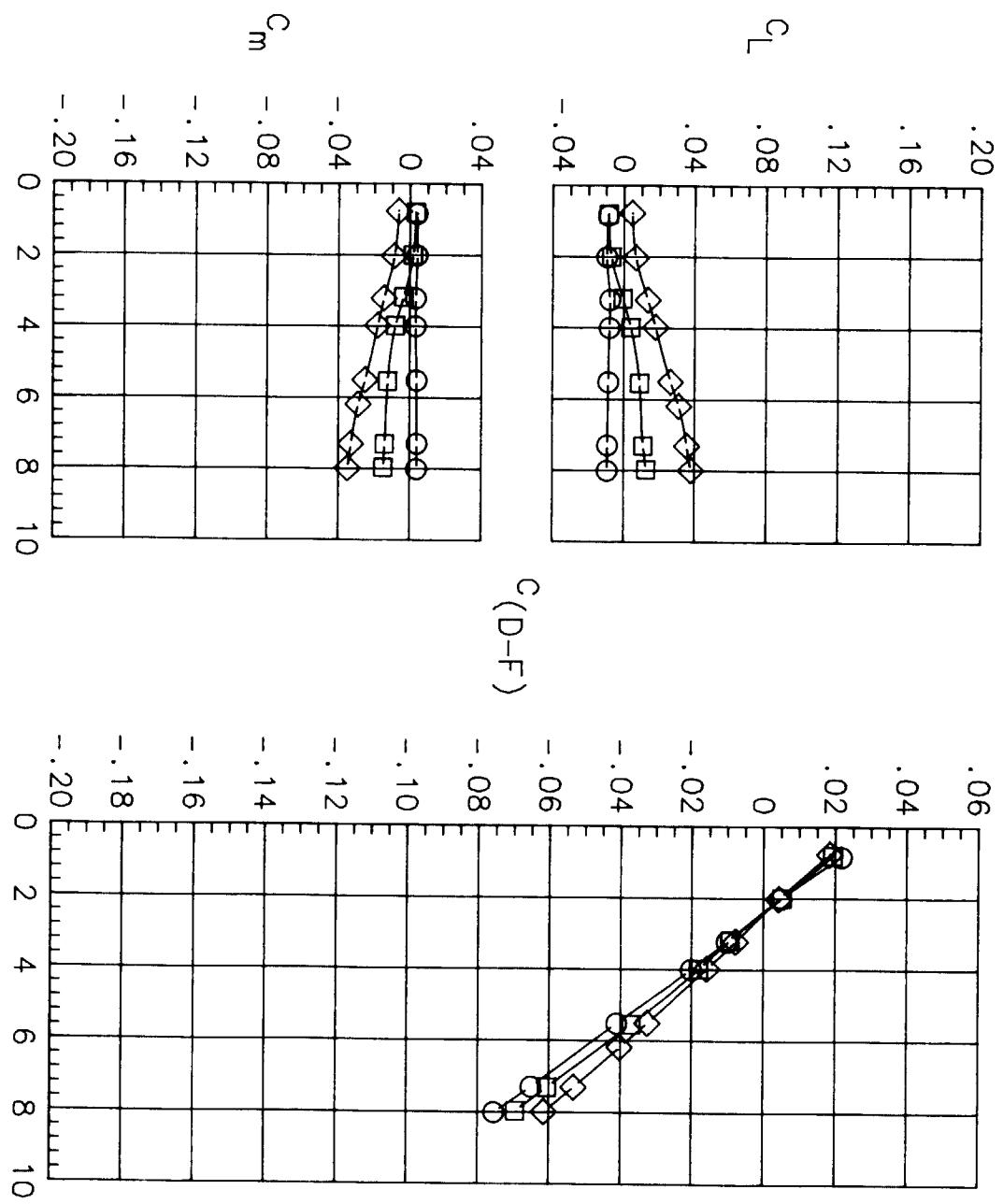
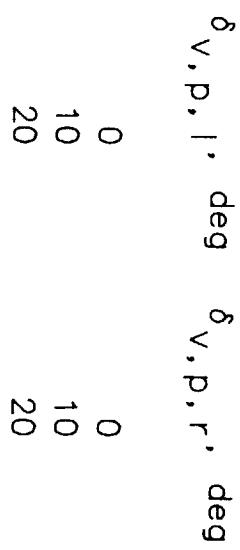
(c) $M = 0.80$.

Figure 17. Continued.



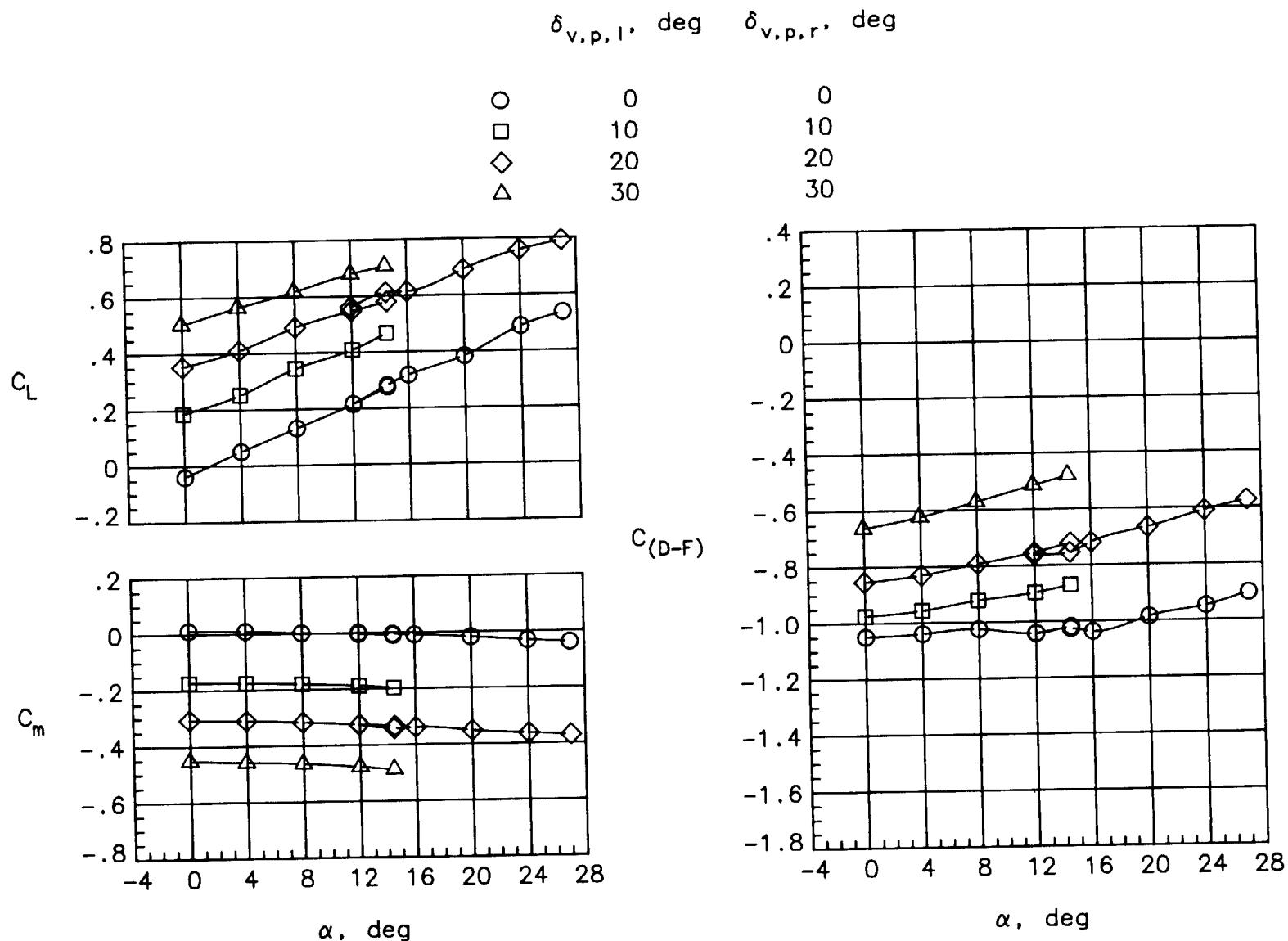
(d) $M = 0.90$.

Figure 17. Continued.



(e) $M = 1.20$.

Figure 17. Concluded.



(a) $M = 0.20$, $\text{NPR} = 3.2$.

Figure 18. Effect of symmetric nozzle pitch vectoring on total longitudinal aerodynamic characteristics for standard flaps with $\theta = 30^\circ$.

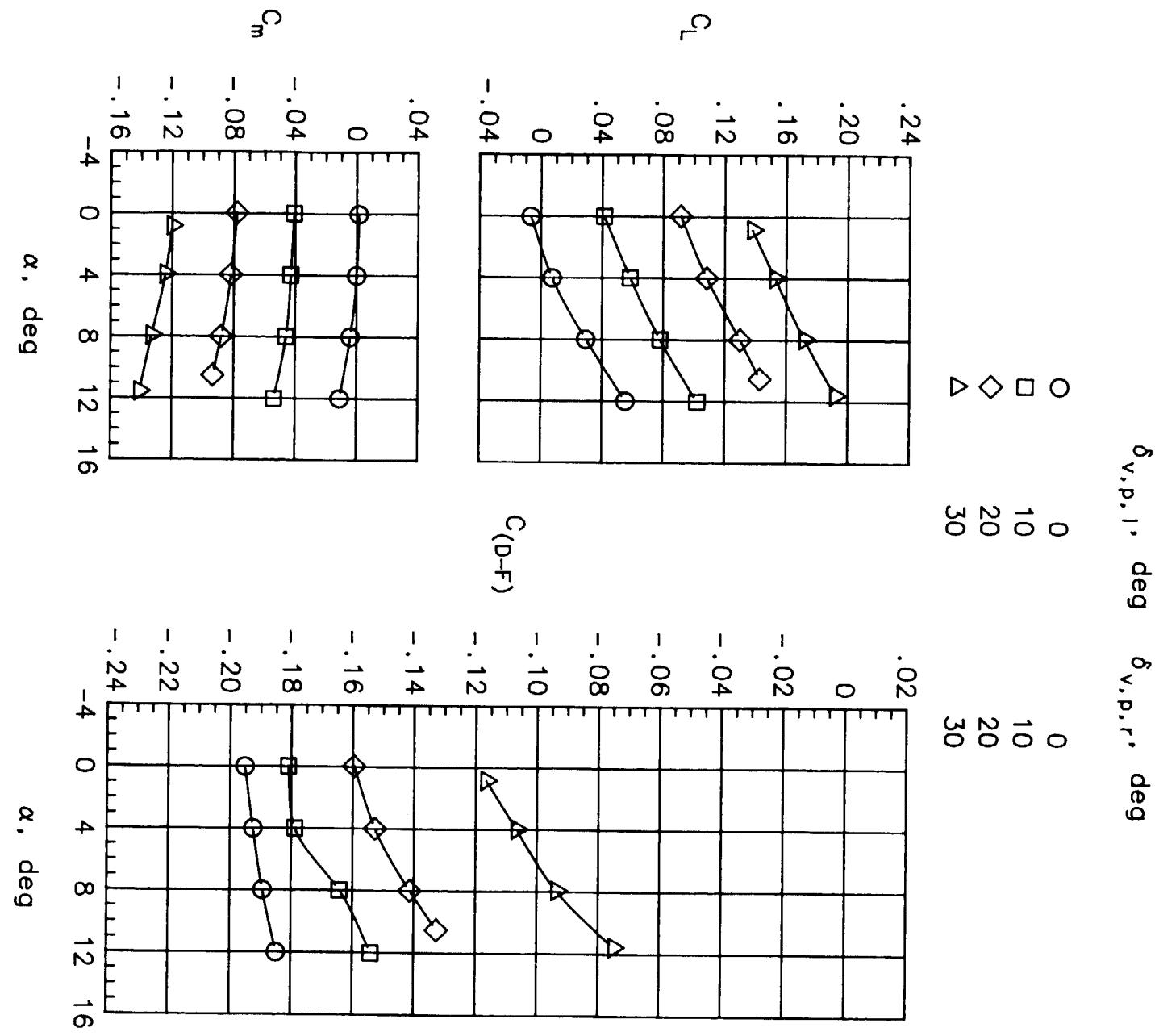
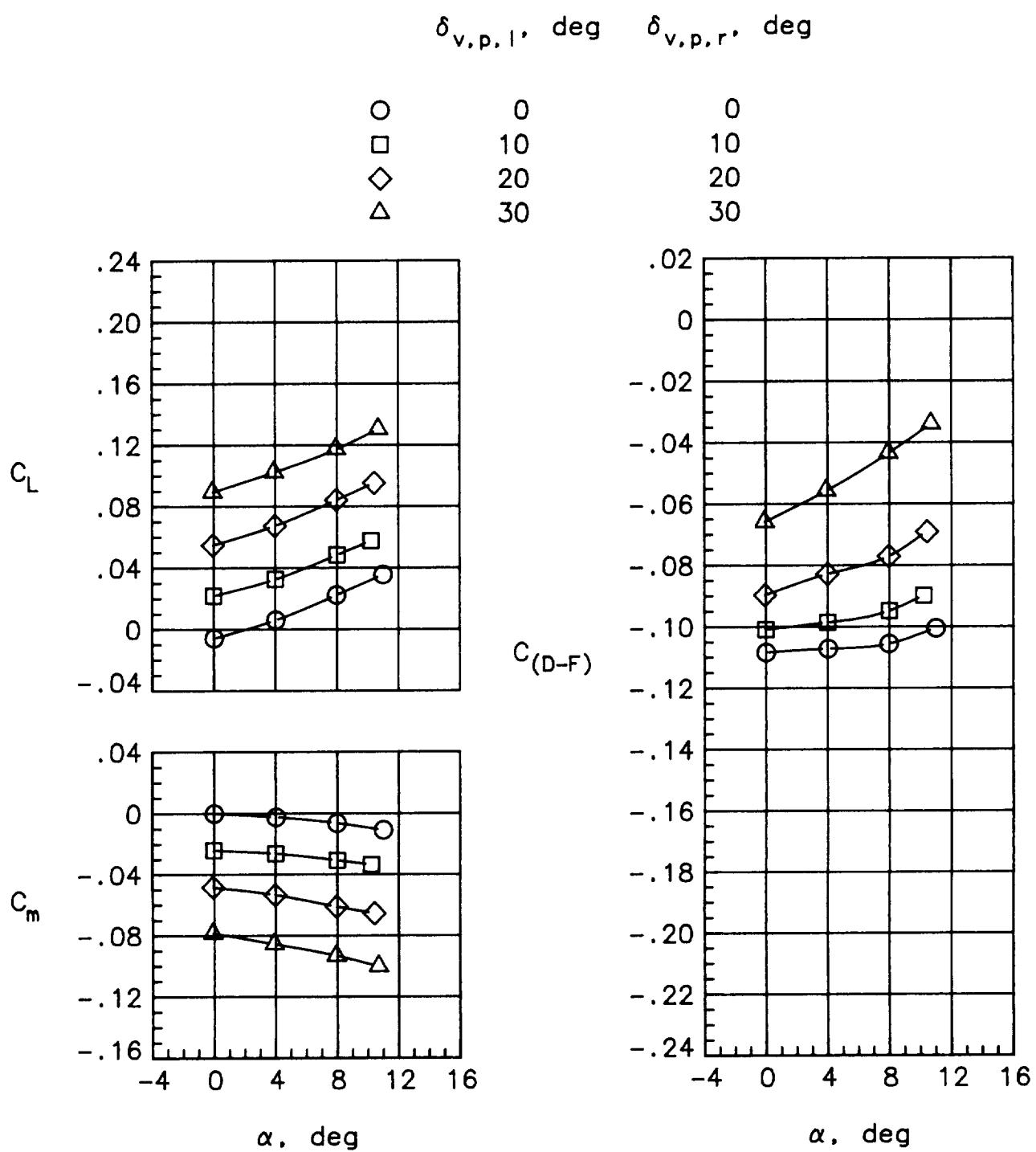
(b) $M = 0.60$, NPR = 4.8.

Figure 18. Continued.



(c) $M = 0.90$, $\text{NPR} = 6.0$.

Figure 18. Concluded.

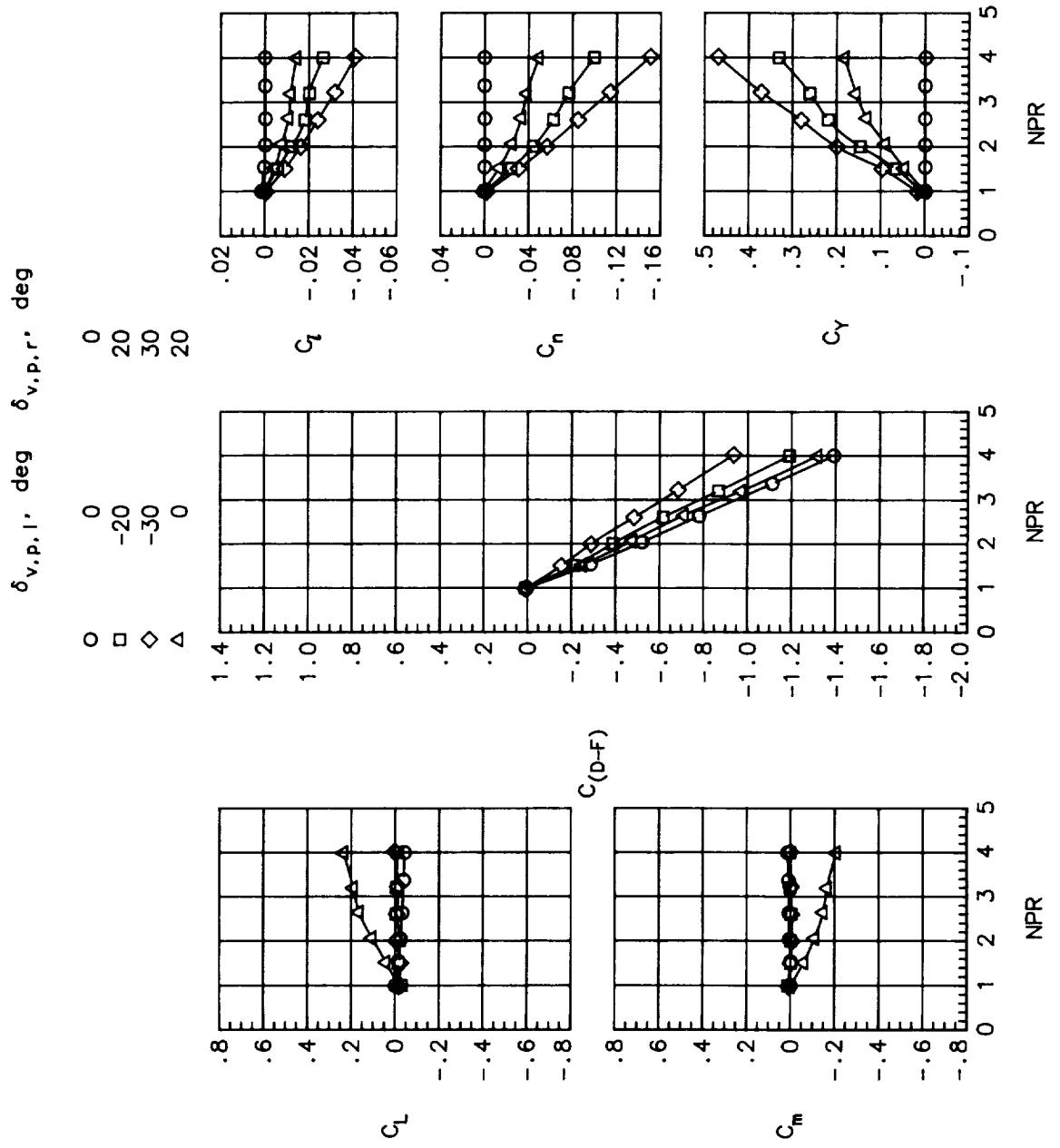
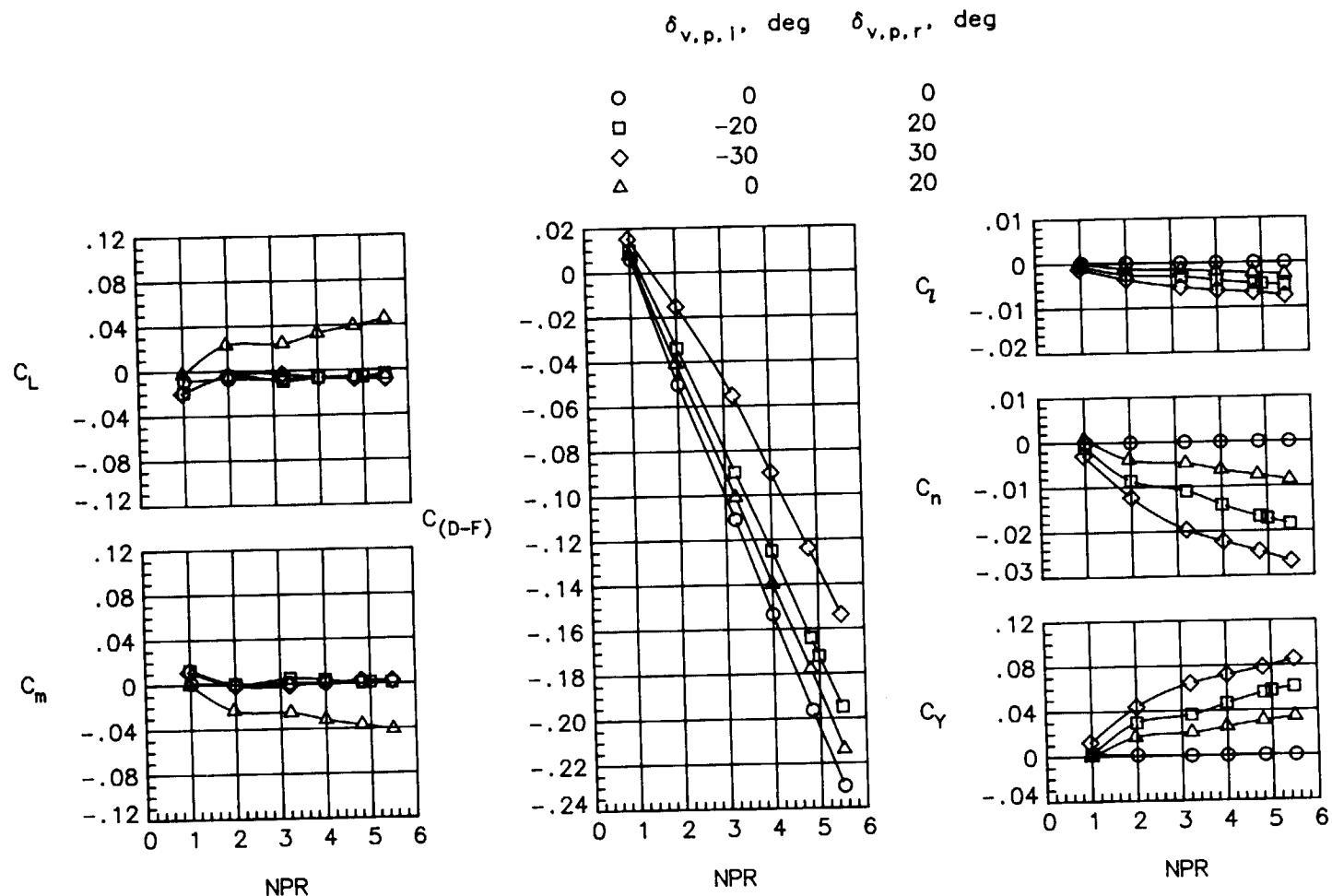
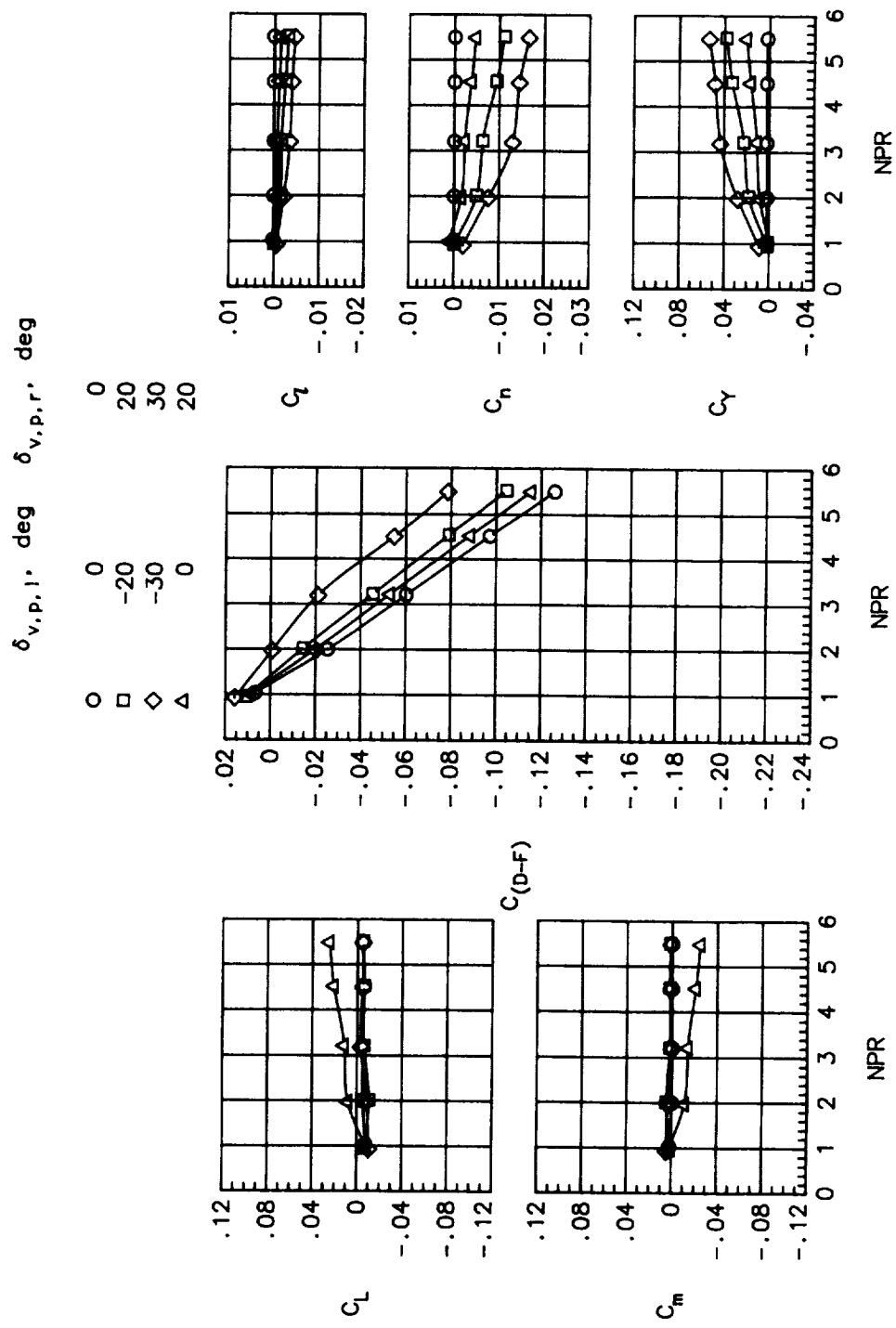
(a) $M = 0.20$.

Figure 19. Effect of differential nozzle pitch vectoring on total aerodynamic characteristics for standard flaps with $\theta = 30^\circ$ and $\alpha = 0^\circ$.



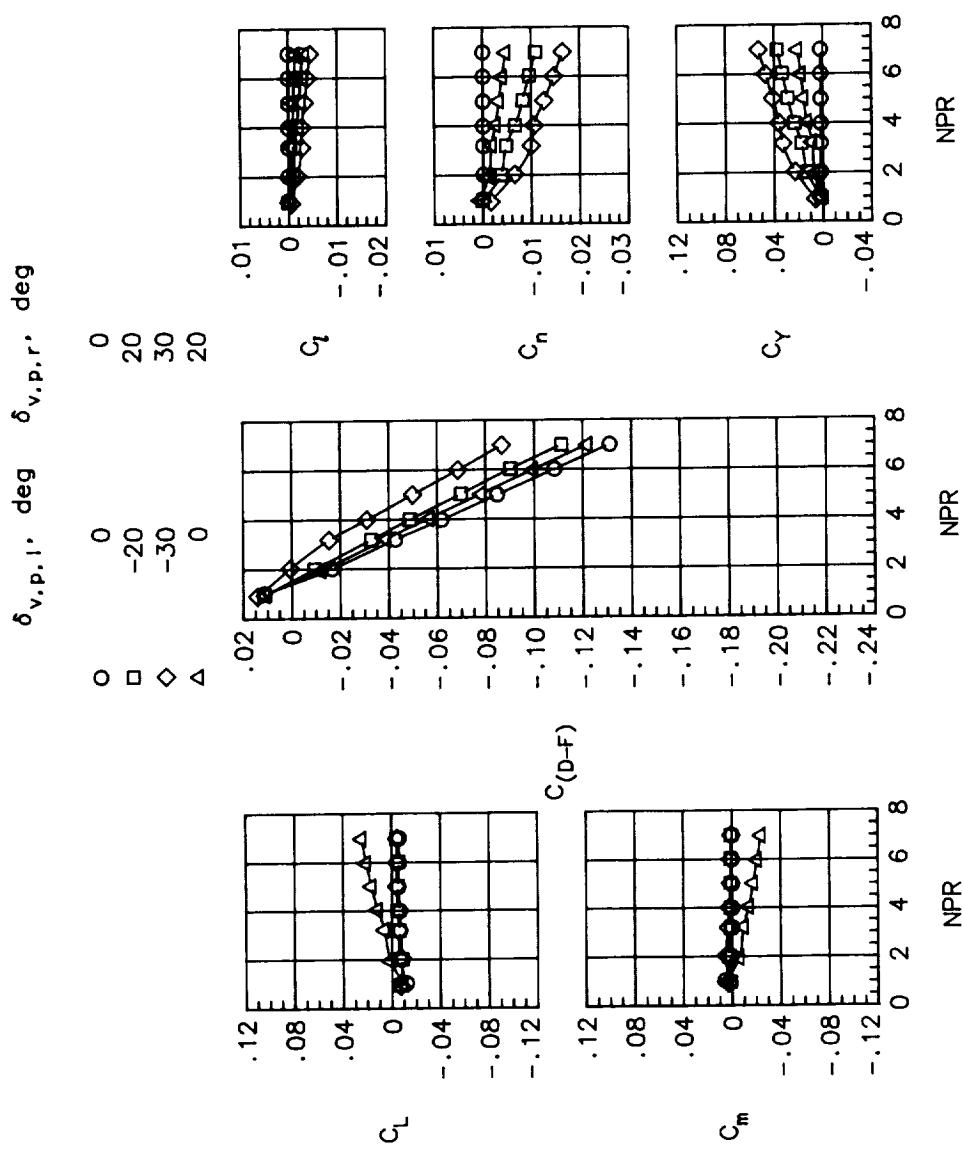
(b) $M = 0.60$.

Figure 19. Continued.



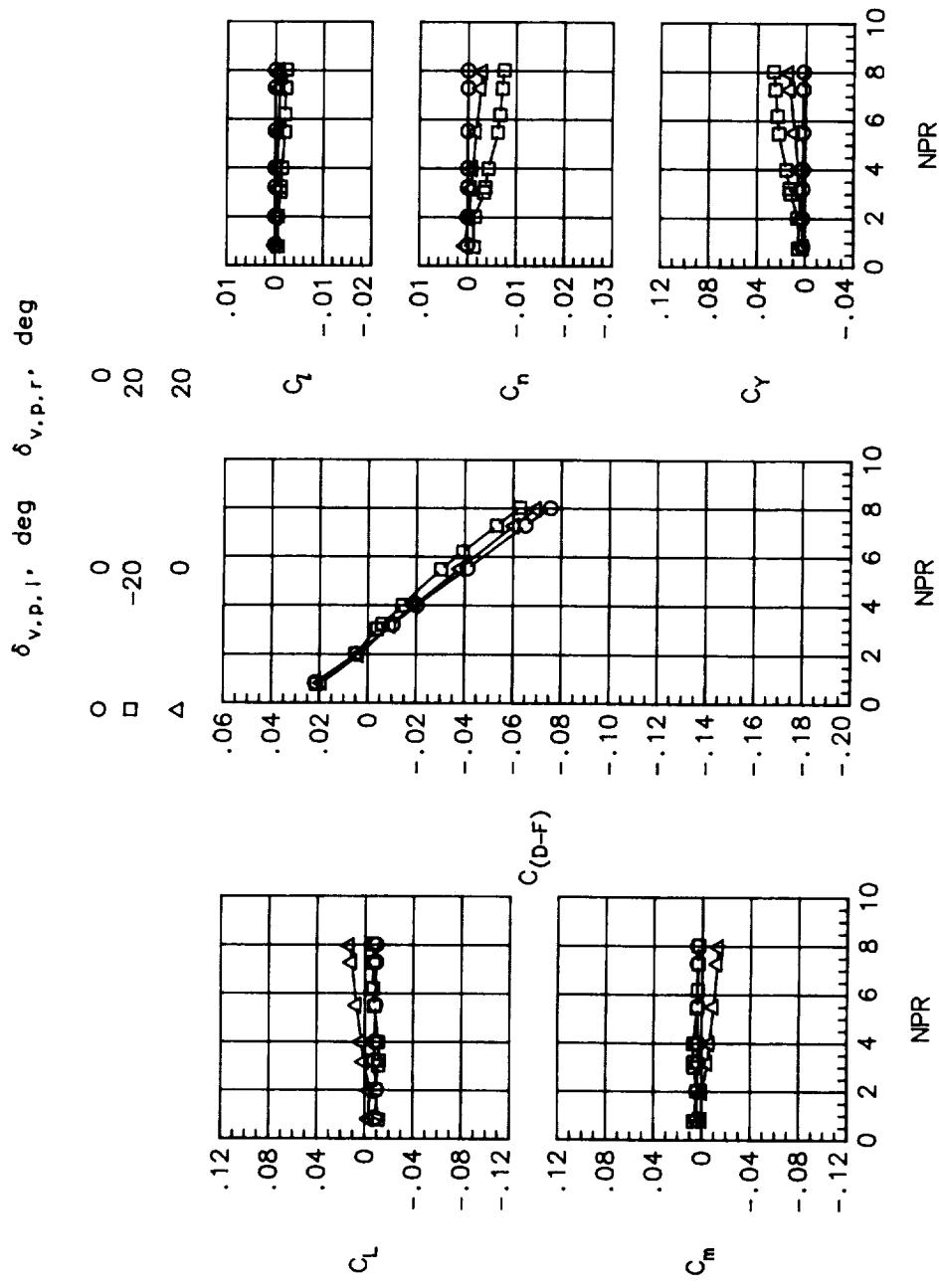
(c) $M = 0.80$.

Figure 19. Continued.



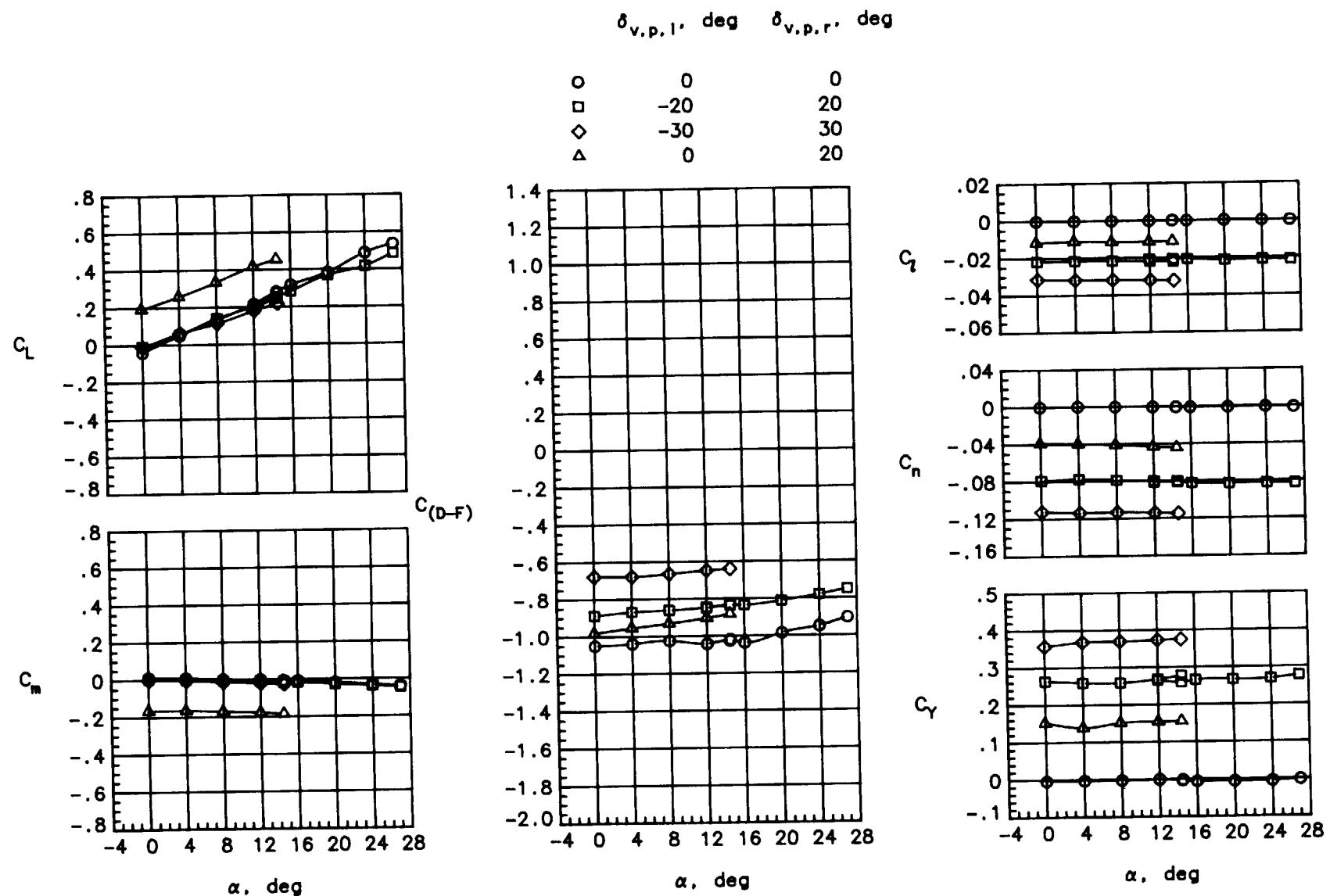
(d) $M = 0.90$.

Figure 19. Continued.



(e) $M = 1.20$.

Figure 19. Concluded.



(a) $M = 0.20$, $\text{NPR} = 3.2$.

Figure 20. Effect of differential nozzle pitch vectoring on total aerodynamic characteristics for standard flaps with $\theta = 30^\circ$.

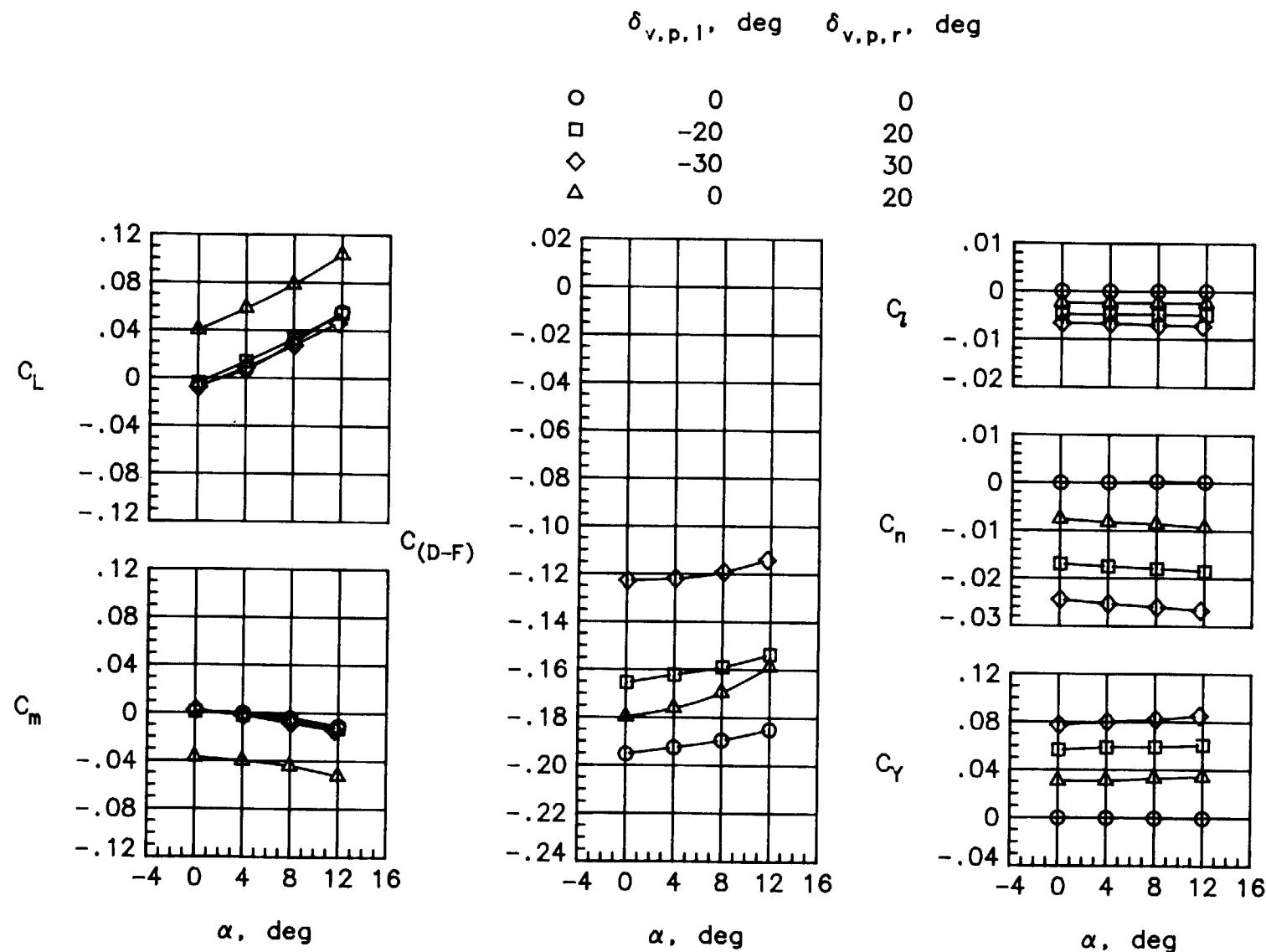
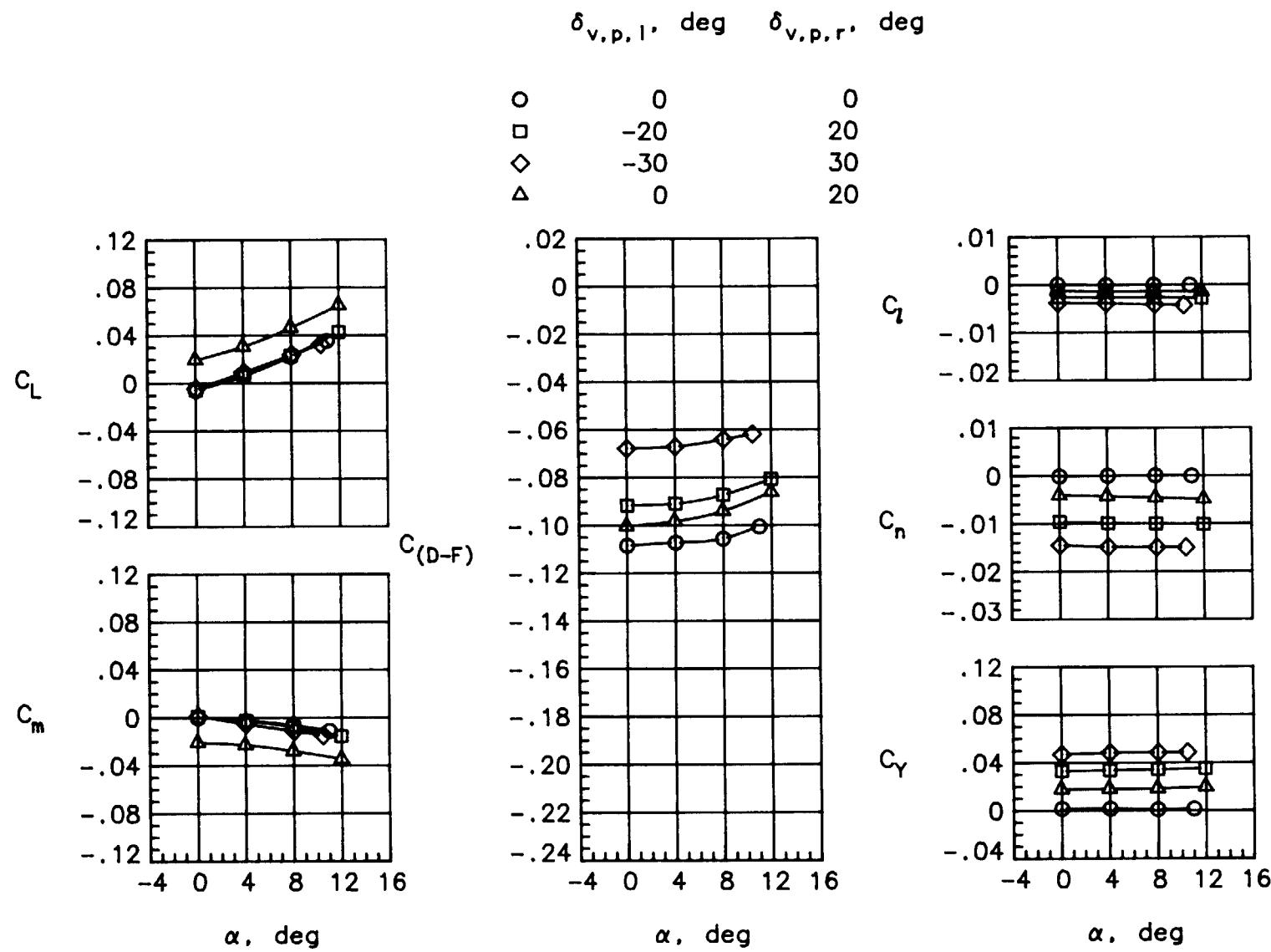
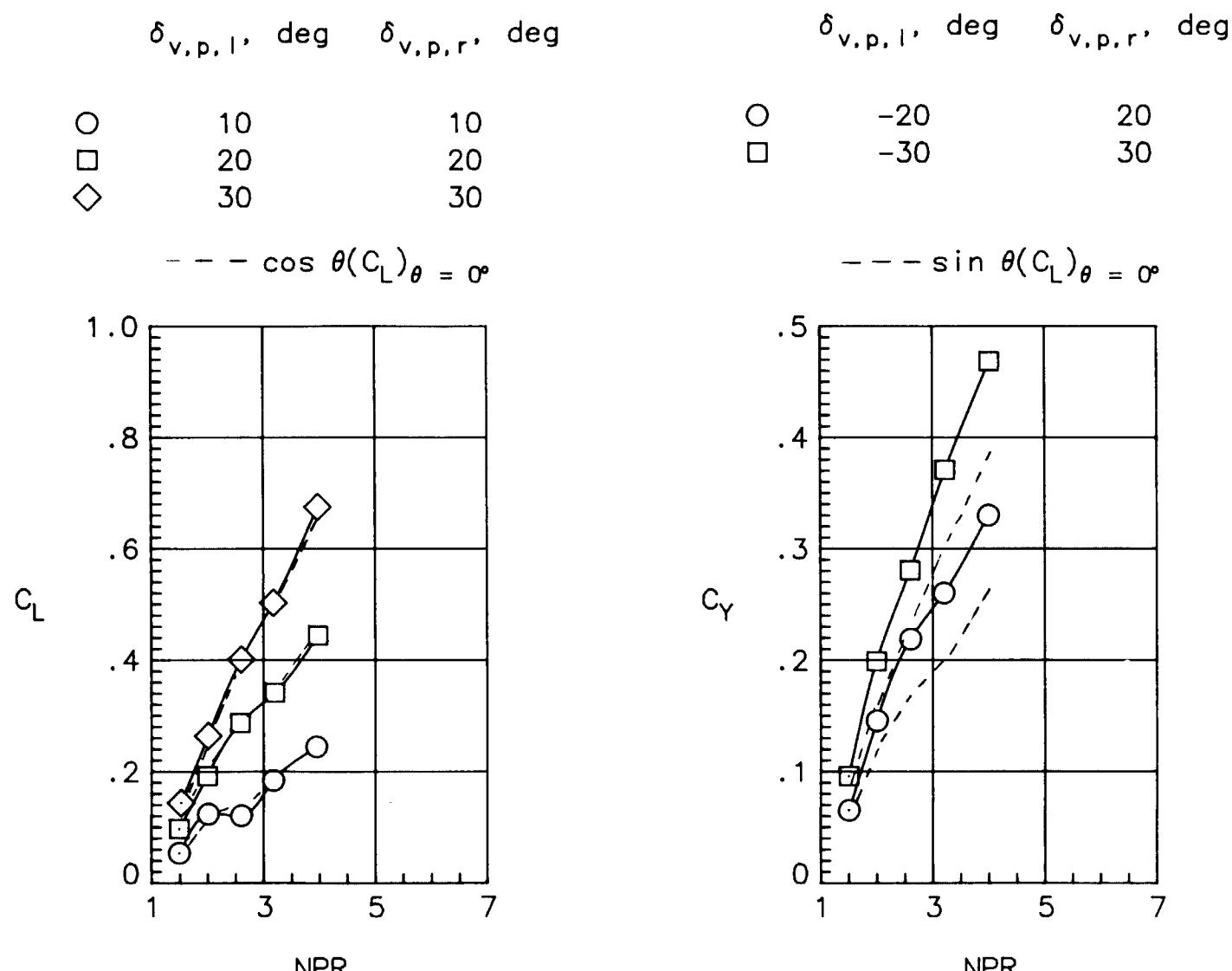
(b) $M = 0.60$, NPR = 4.8.

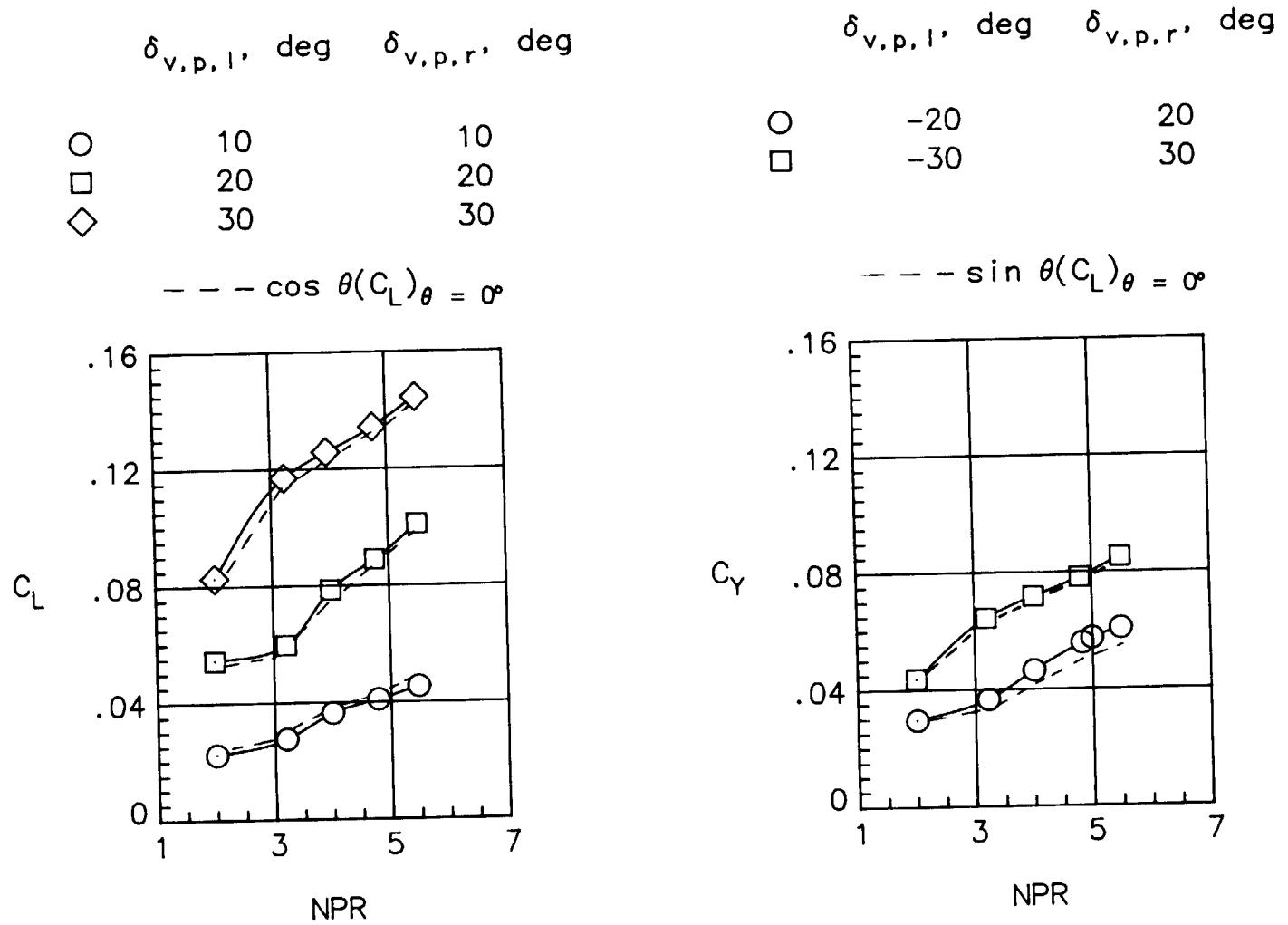
Figure 20. Continued.



(c) $M = 0.90$, $\text{NPR} = 6.0$.

Figure 20. Concluded.

(a) $M = 0.20$.Figure 21. Comparison of measured and predicted lift and side-force coefficients. $\theta = 30^\circ$; and $\alpha = 0^\circ$.



(b) $M = 0.60$.

Figure 21. Continued.

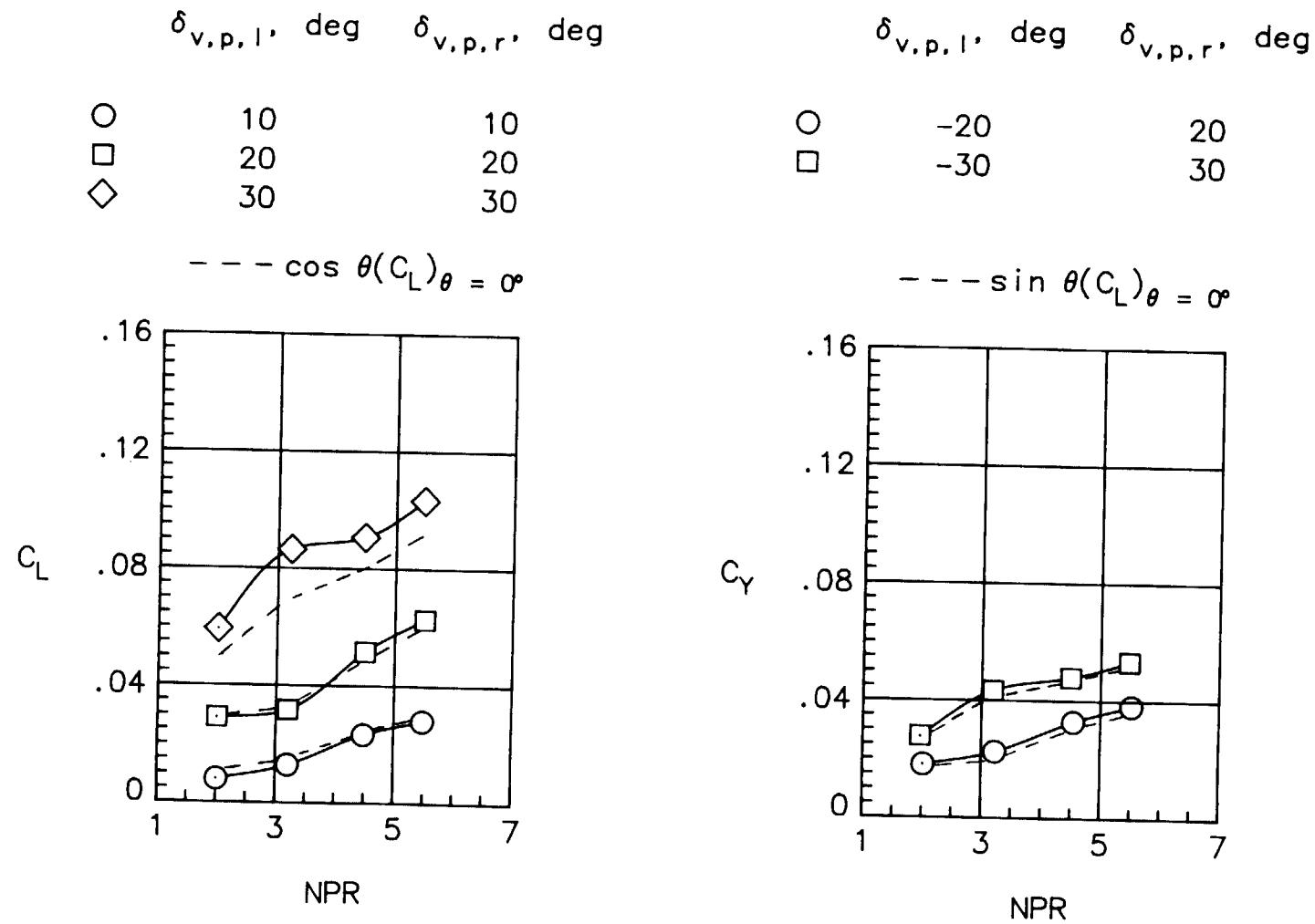
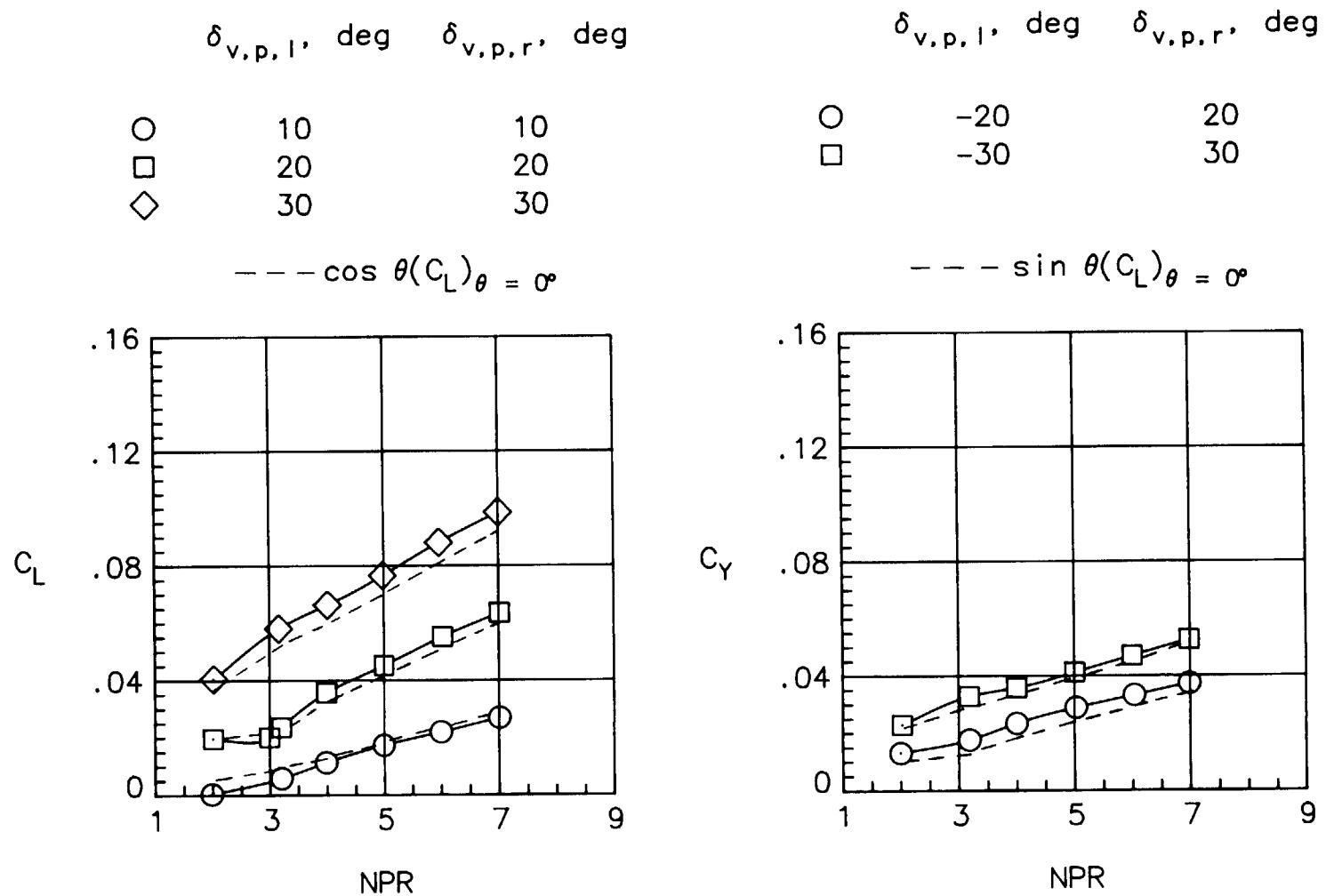
(c) $M = 0.80$.

Figure 21. Continued.



(d) $M = 0.90.$

Figure 21. Continued.

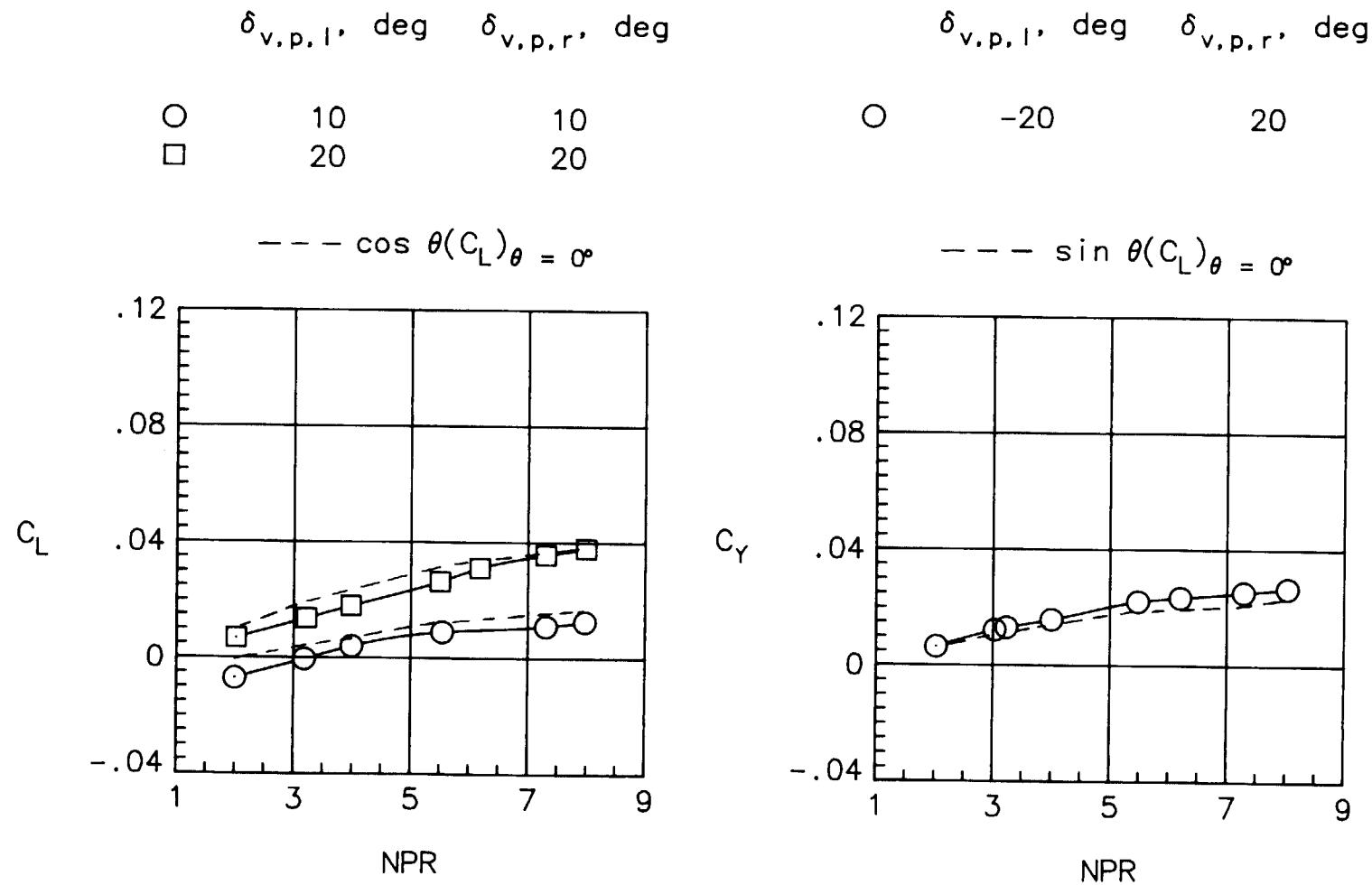
(e) $M = 1.20$.

Figure 21. Concluded.

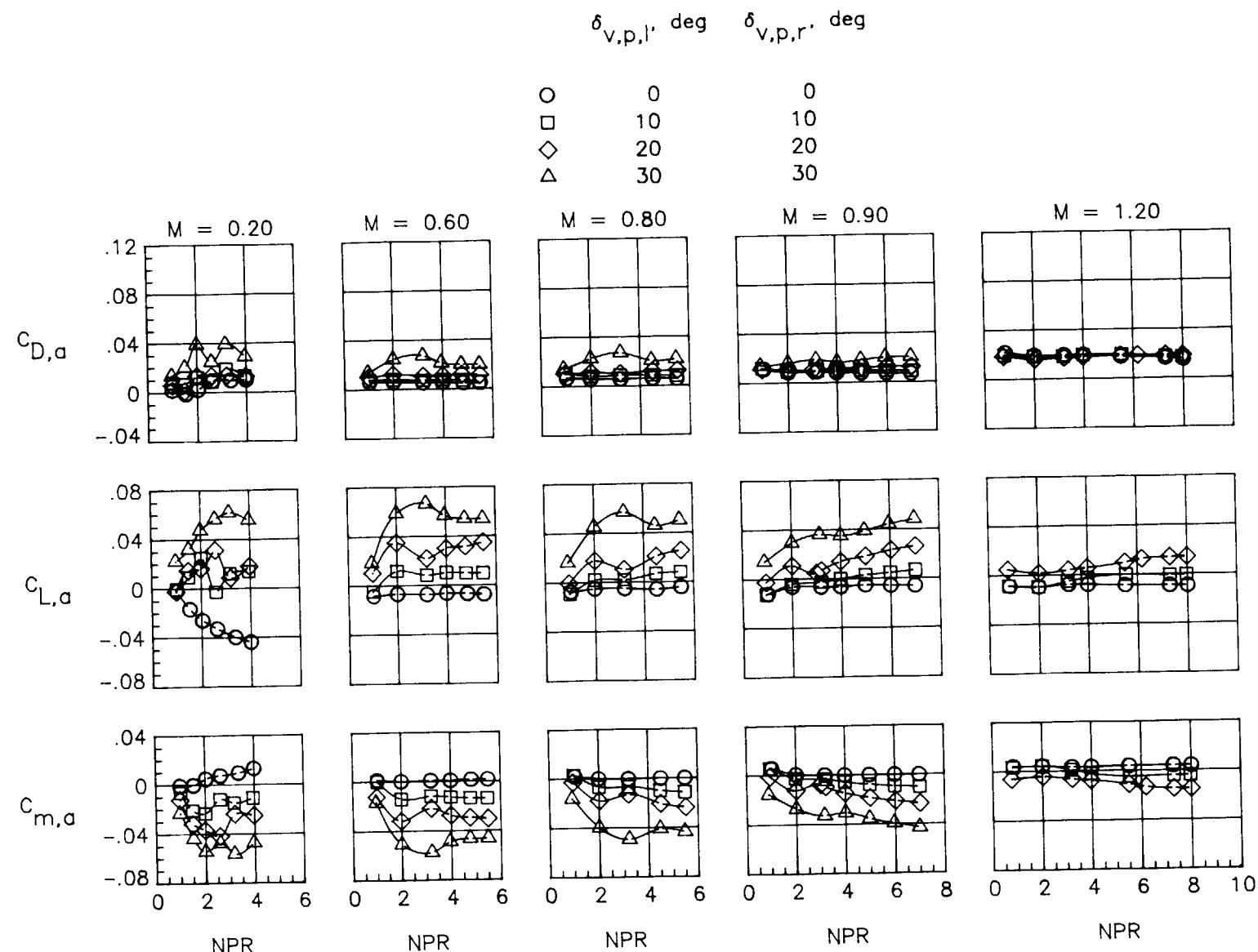


Figure 22. Effect of symmetric nozzle pitch vectoring on thrust-removed longitudinal aerodynamic characteristics for standard flaps with $\theta = 30^\circ$ and $\alpha = 0^\circ$.

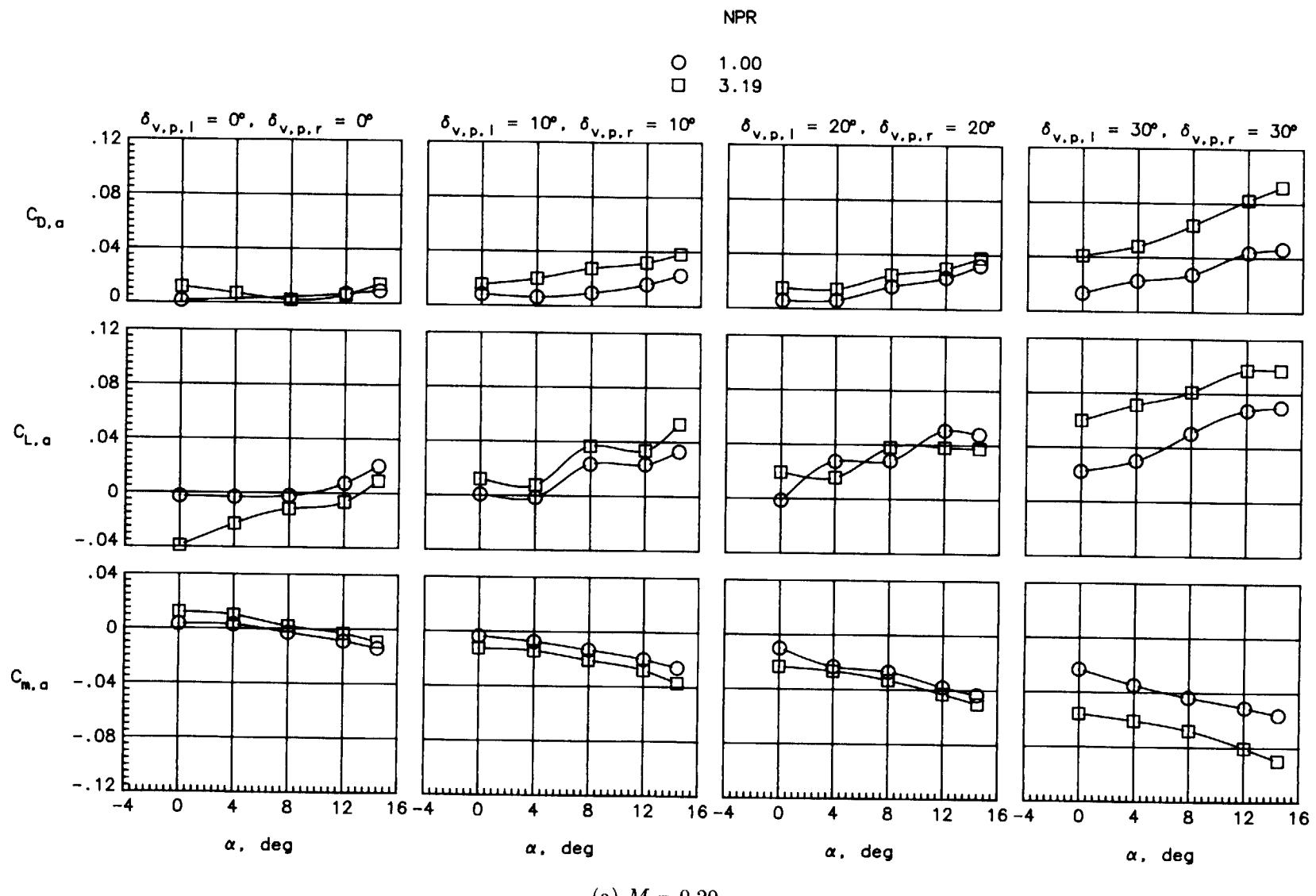
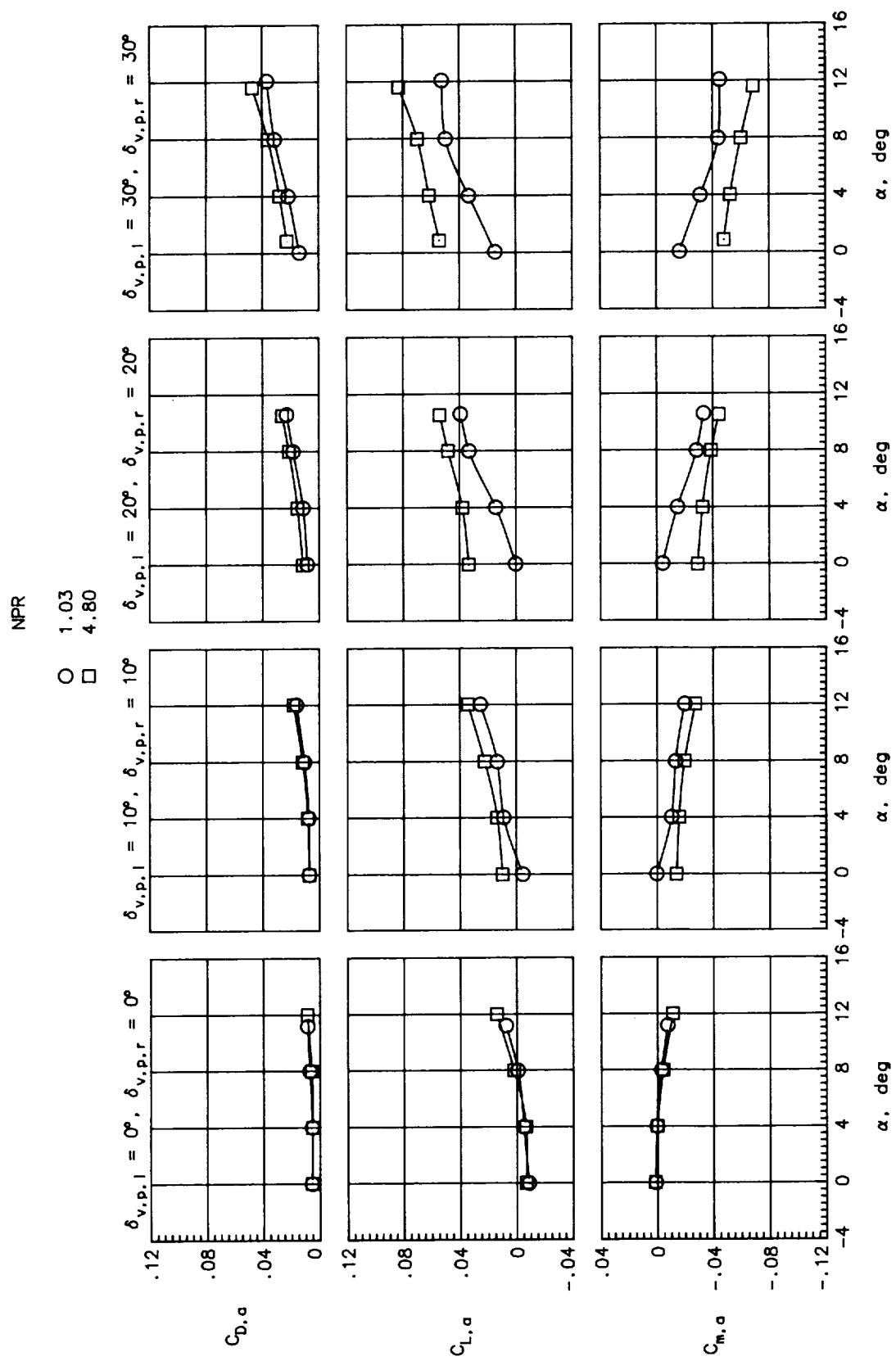
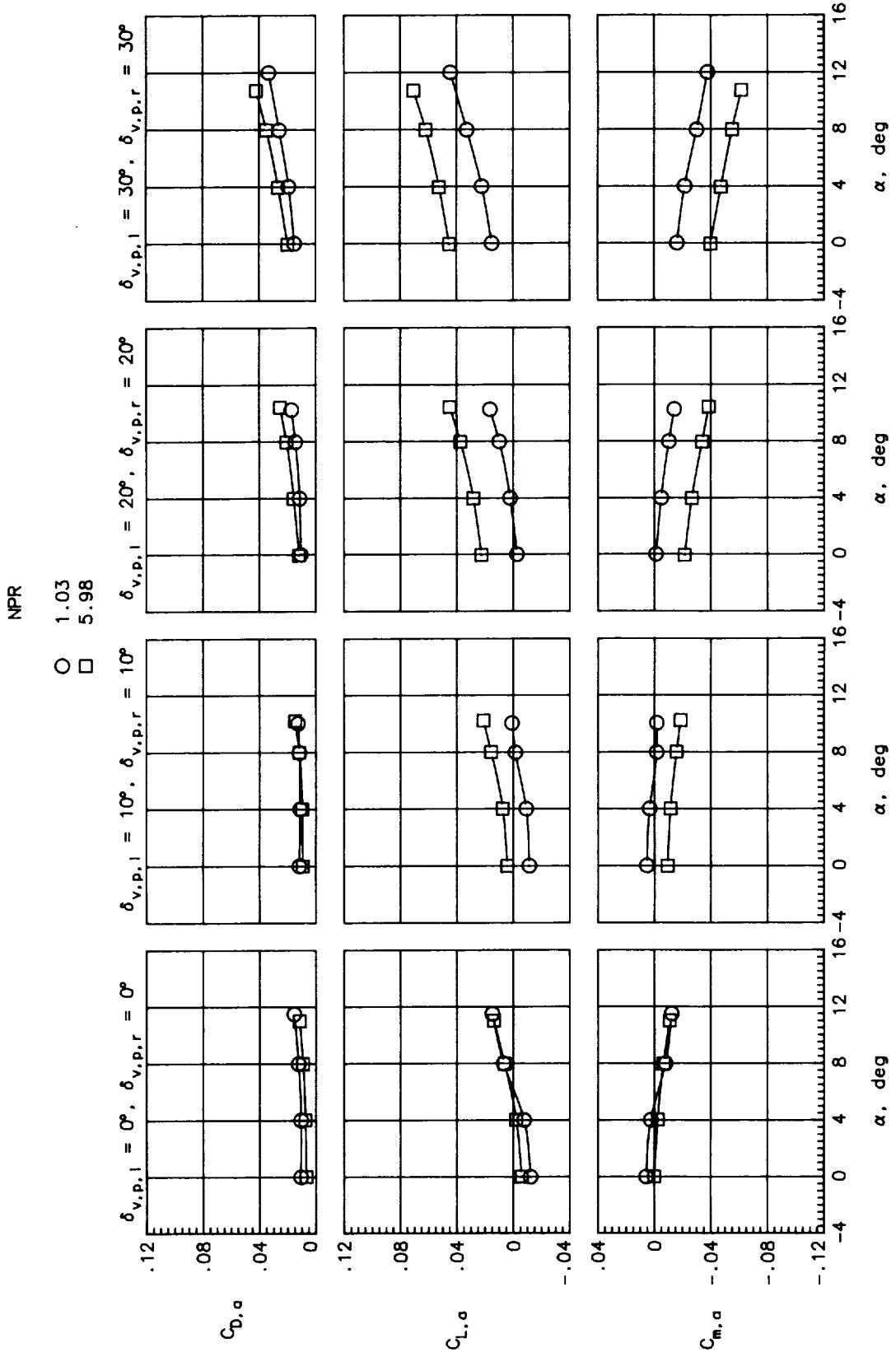


Figure 23. Effect of angle of attack on thrust-removed longitudinal aerodynamic characteristics for standard flaps with $\theta = 30^\circ$ and $\alpha = 0^\circ$.



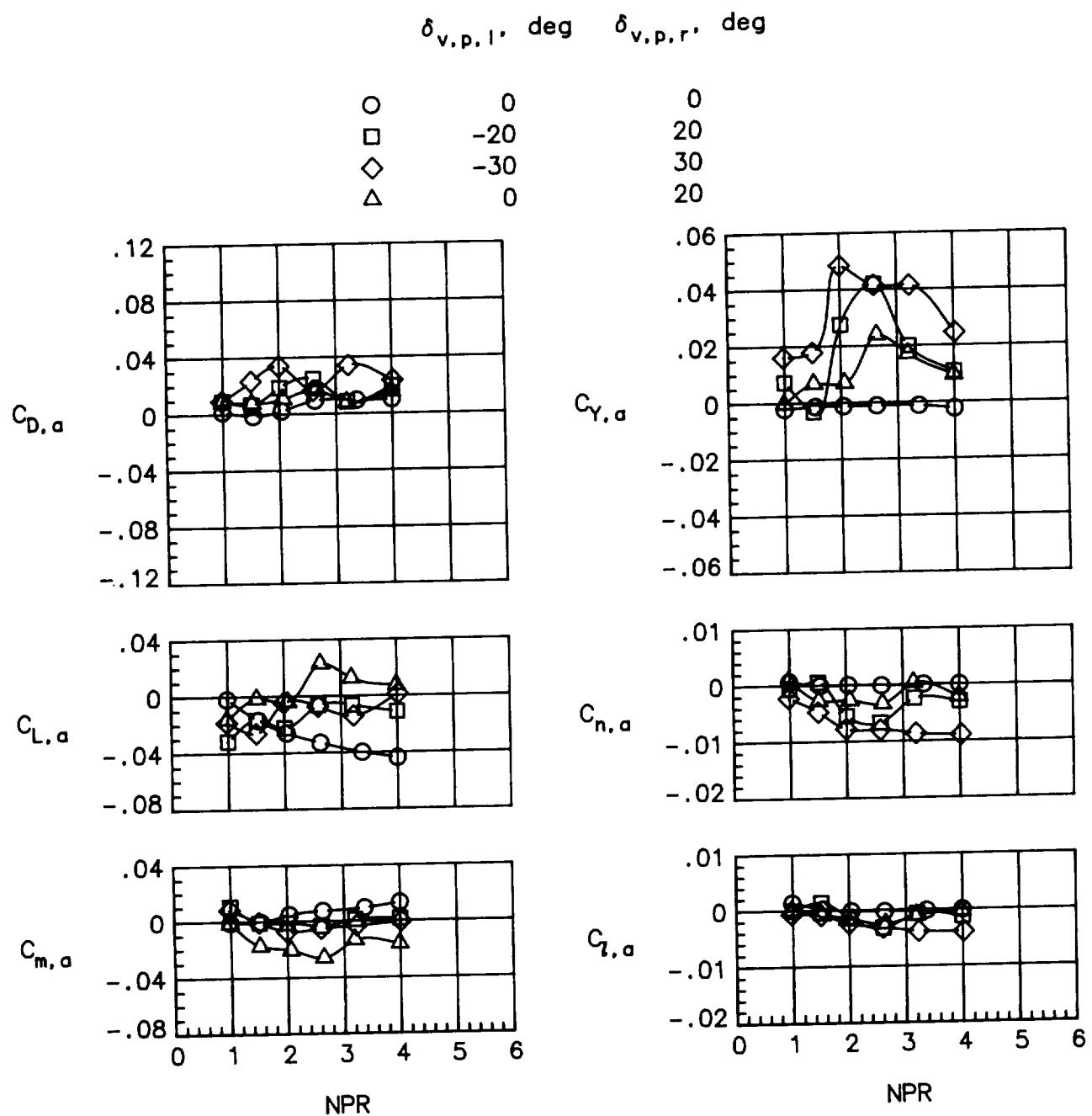
(b) $M = 0.60$.

Figure 23. Continued.



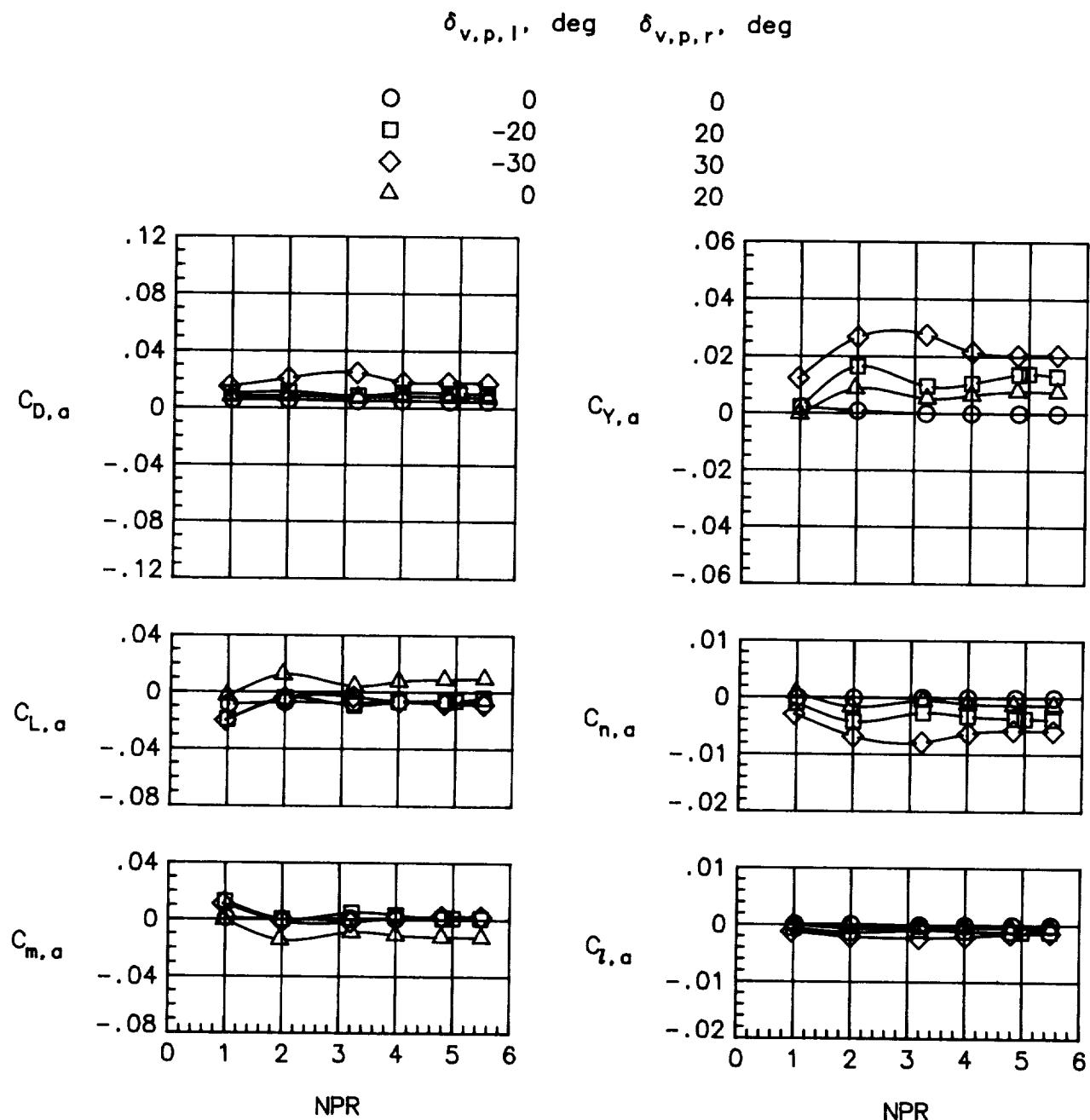
(c) $M = 0.90$.

Figure 23. Concluded.



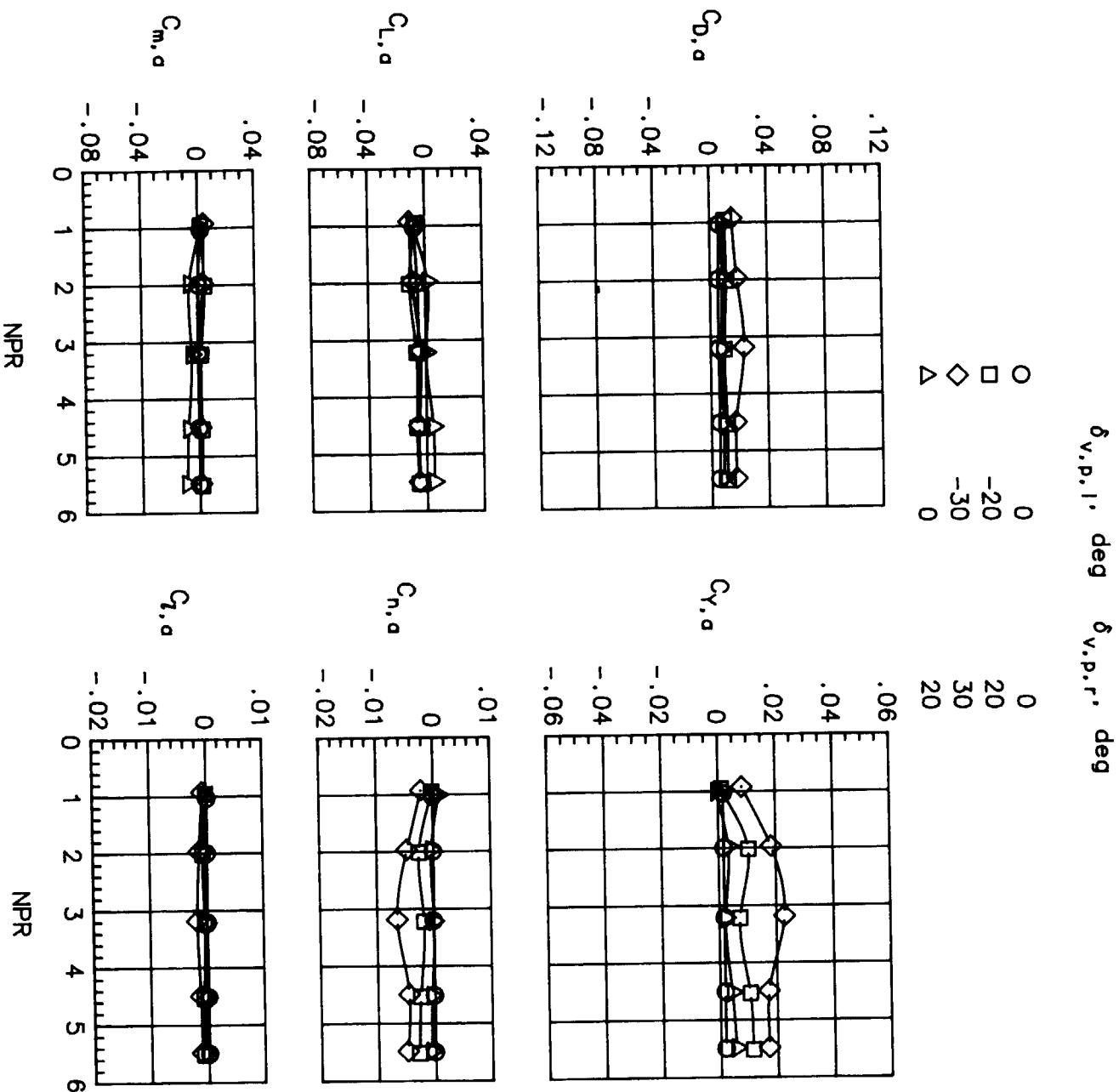
(a) $M = 0.20$.

Figure 24. Effect of differential nozzle pitch vectoring on thrust-removed aerodynamic characteristics for standard flaps with $\theta = 30^\circ$ and $\alpha = 0^\circ$.



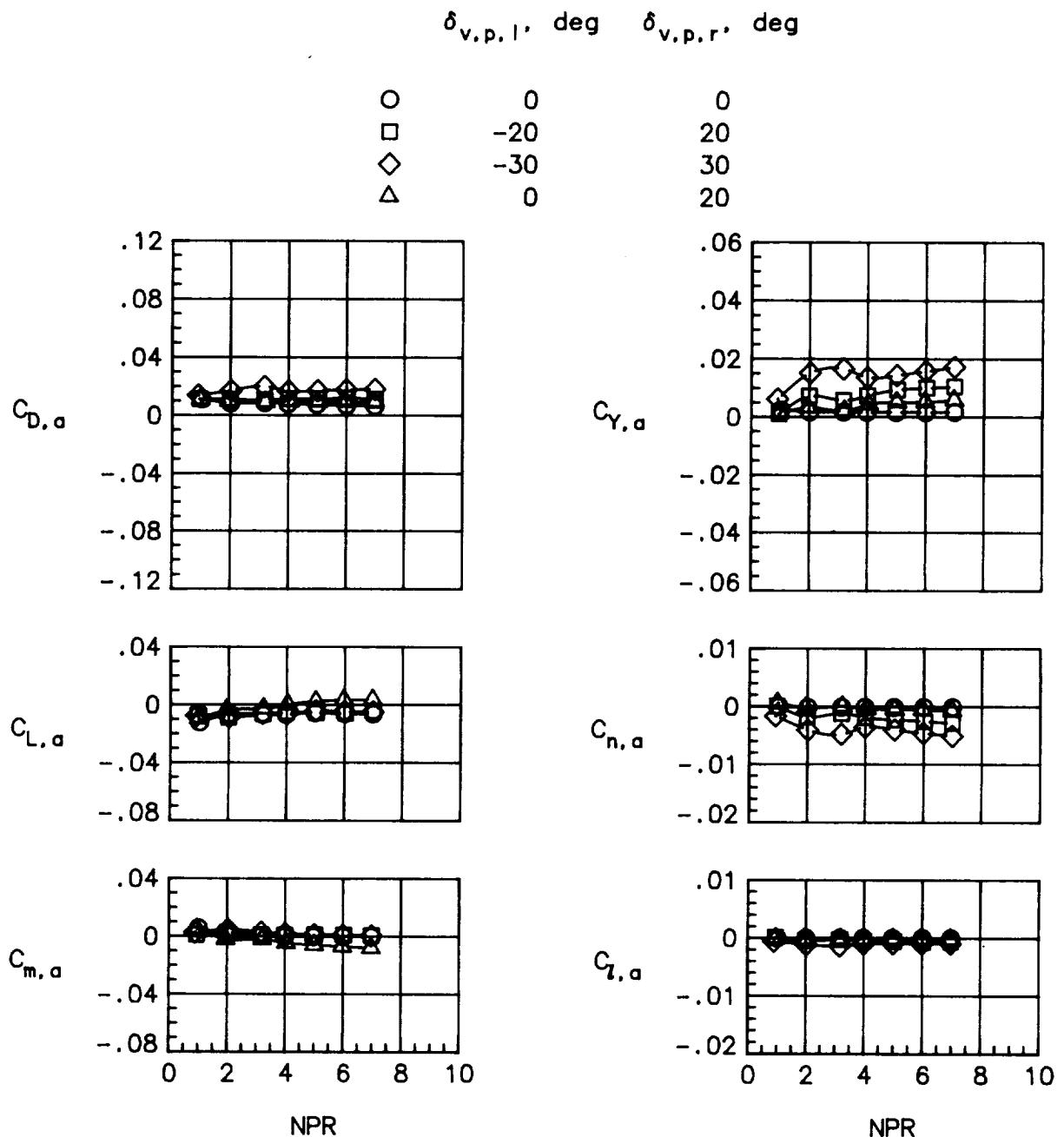
(b) $M = 0.60$.

Figure 24. Continued.



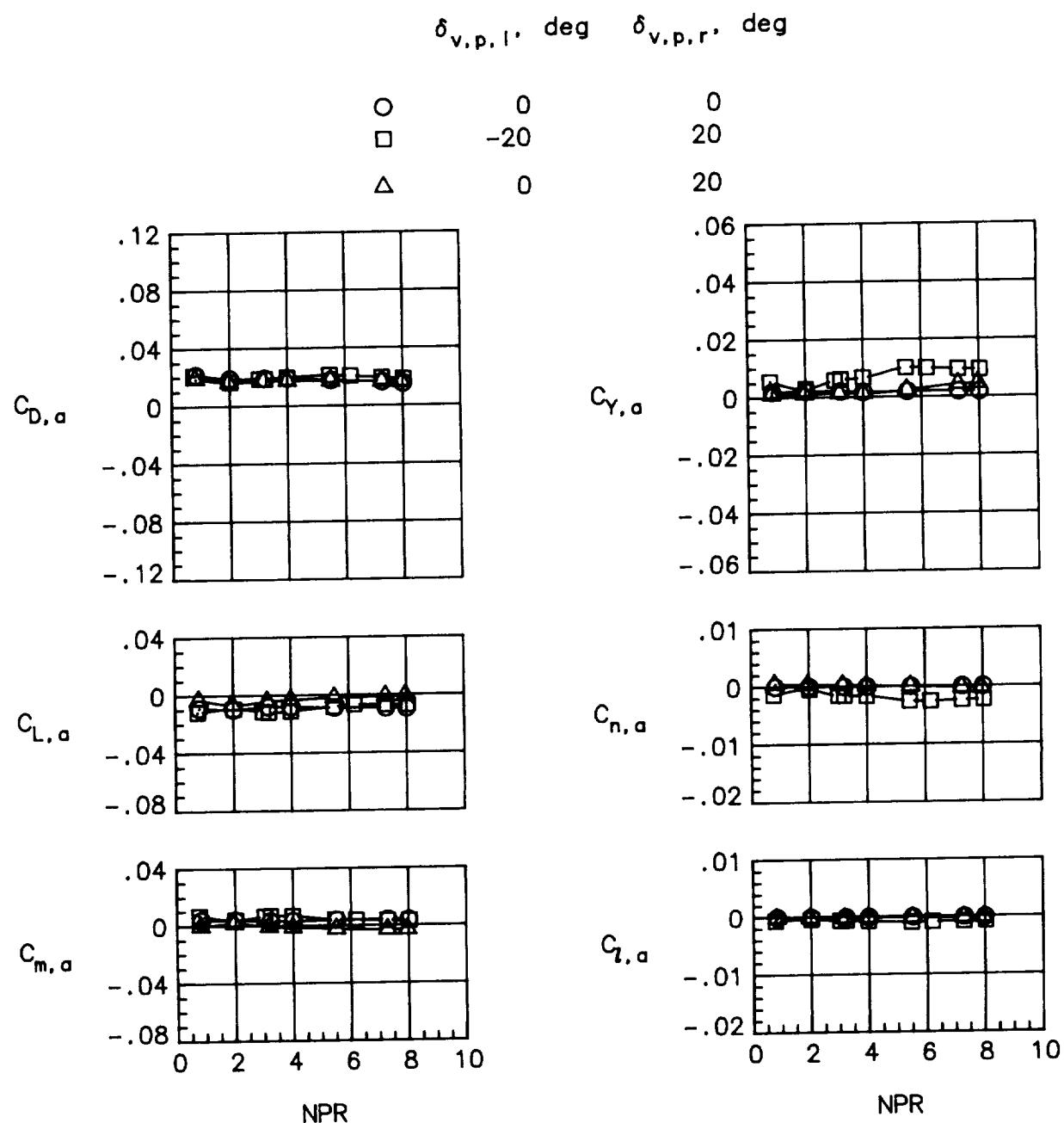
(c) $M = 0.80$.

Figure 24. Continued.



(d) $M = 0.90$.

Figure 24. Continued.



(e) $M = 1.20$.

Figure 24. Concluded.

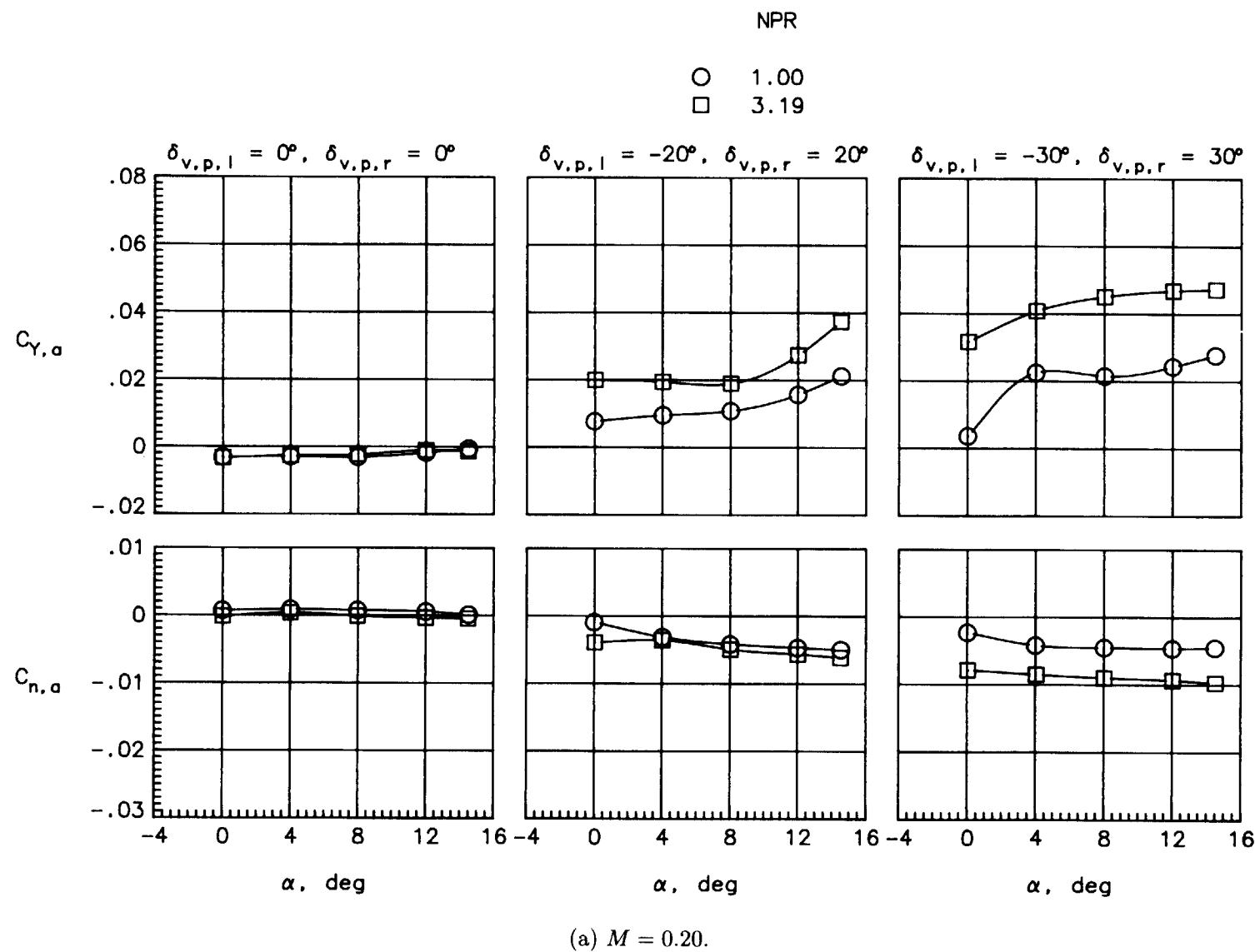
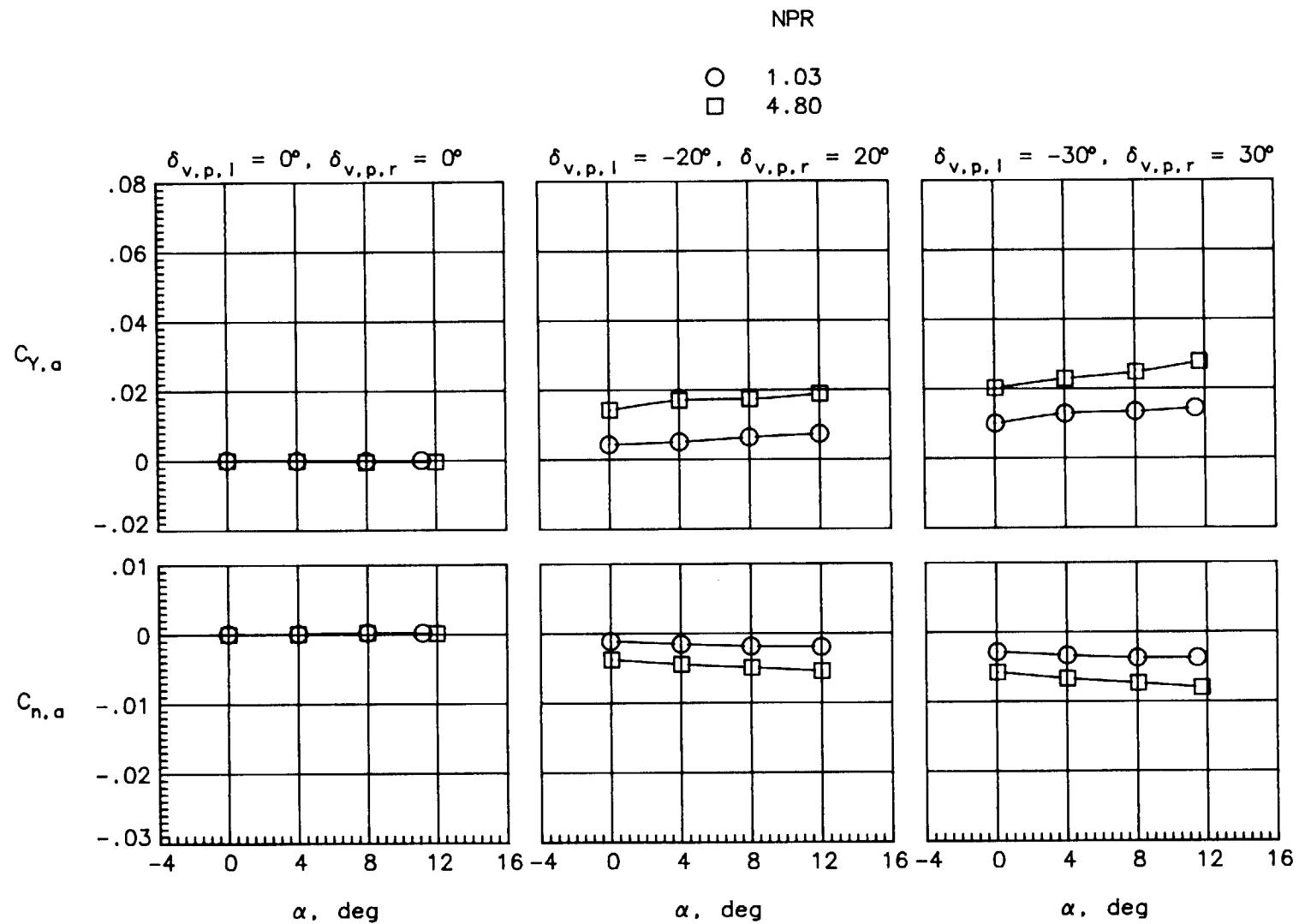


Figure 25. Effect of angle of attack on thrust-removed lateral aerodynamic characteristics for standard flaps with $\theta = 30^\circ$ and $\alpha = 0^\circ$.



(b) $M = 0.60$.

Figure 25. Continued.

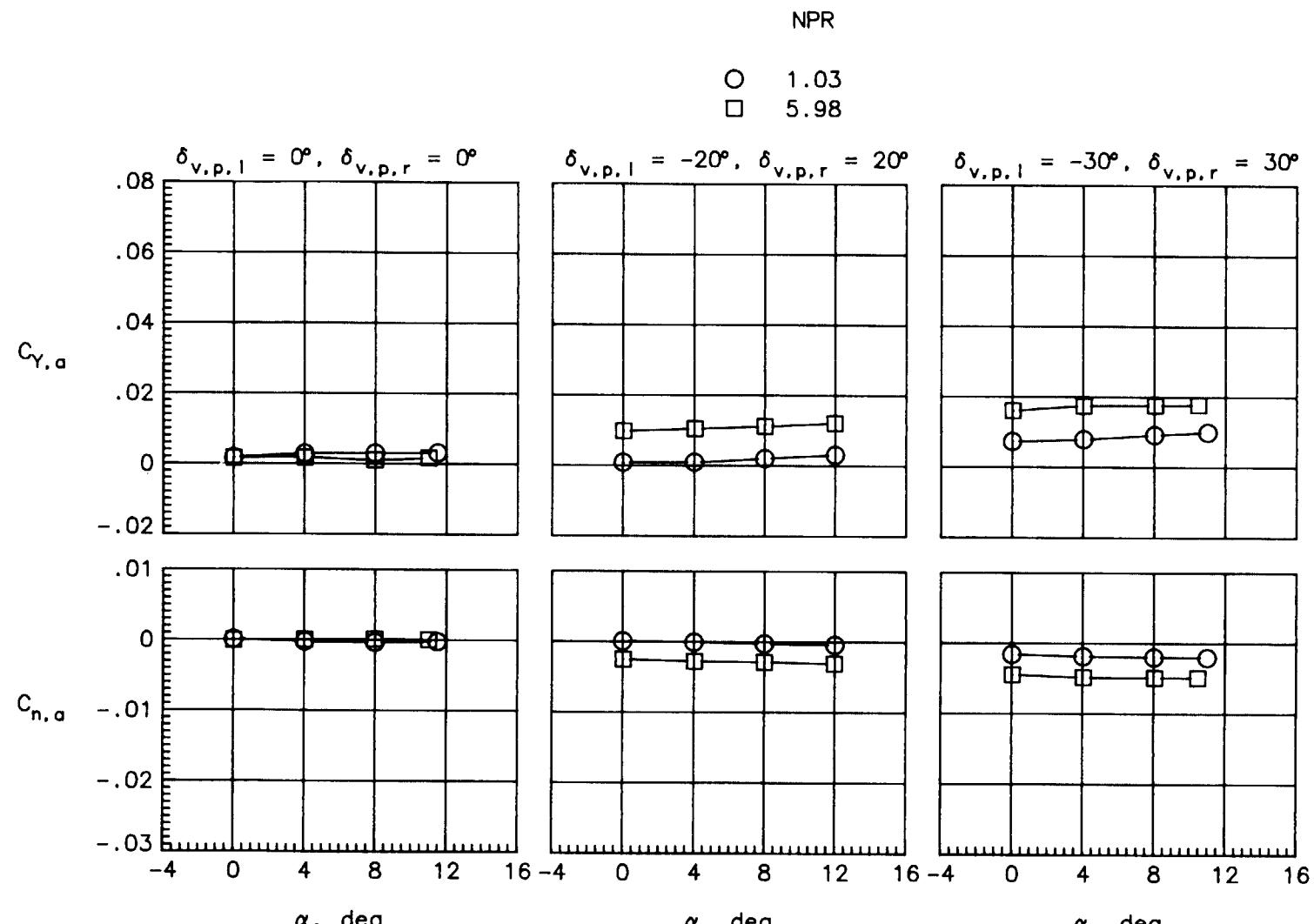
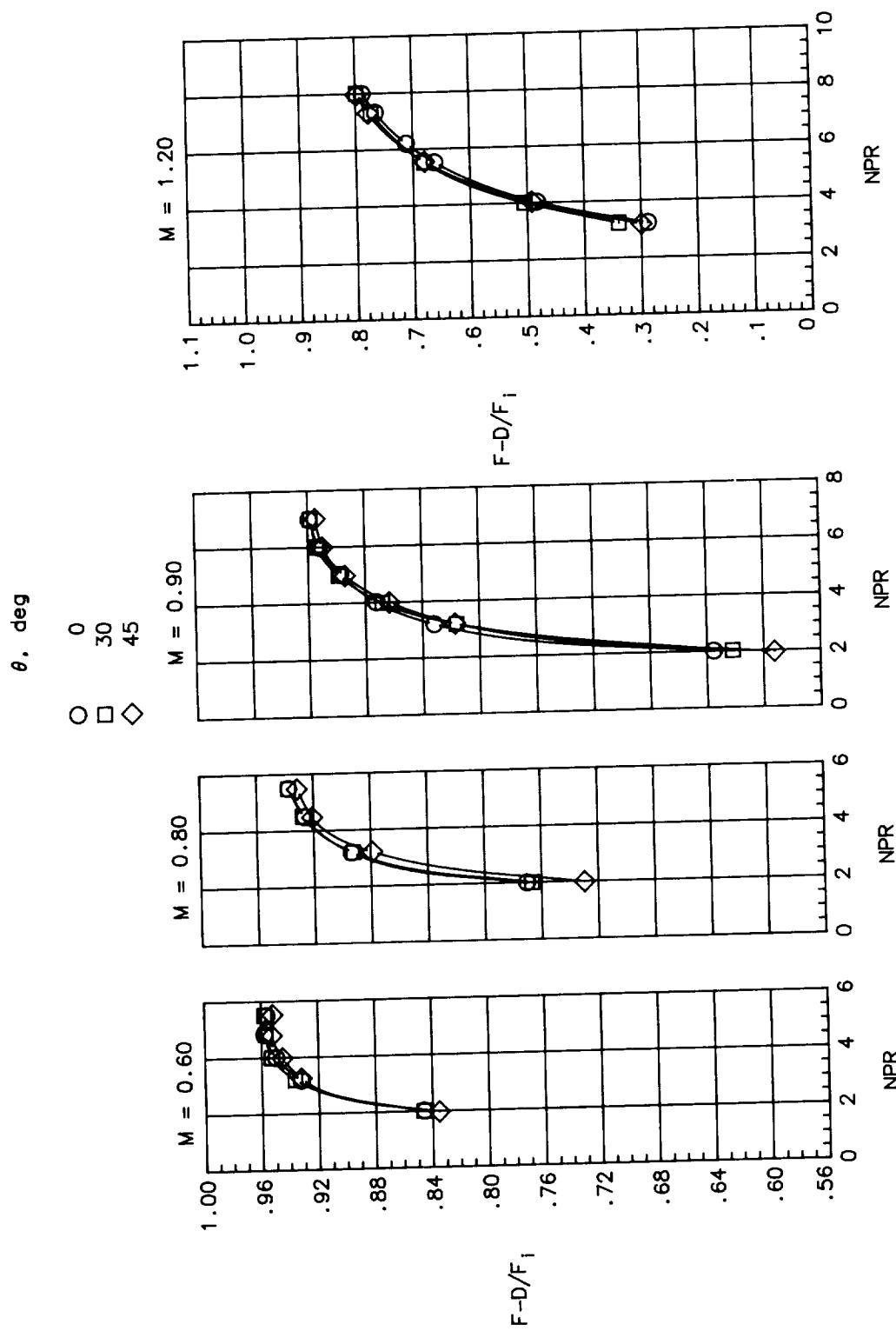
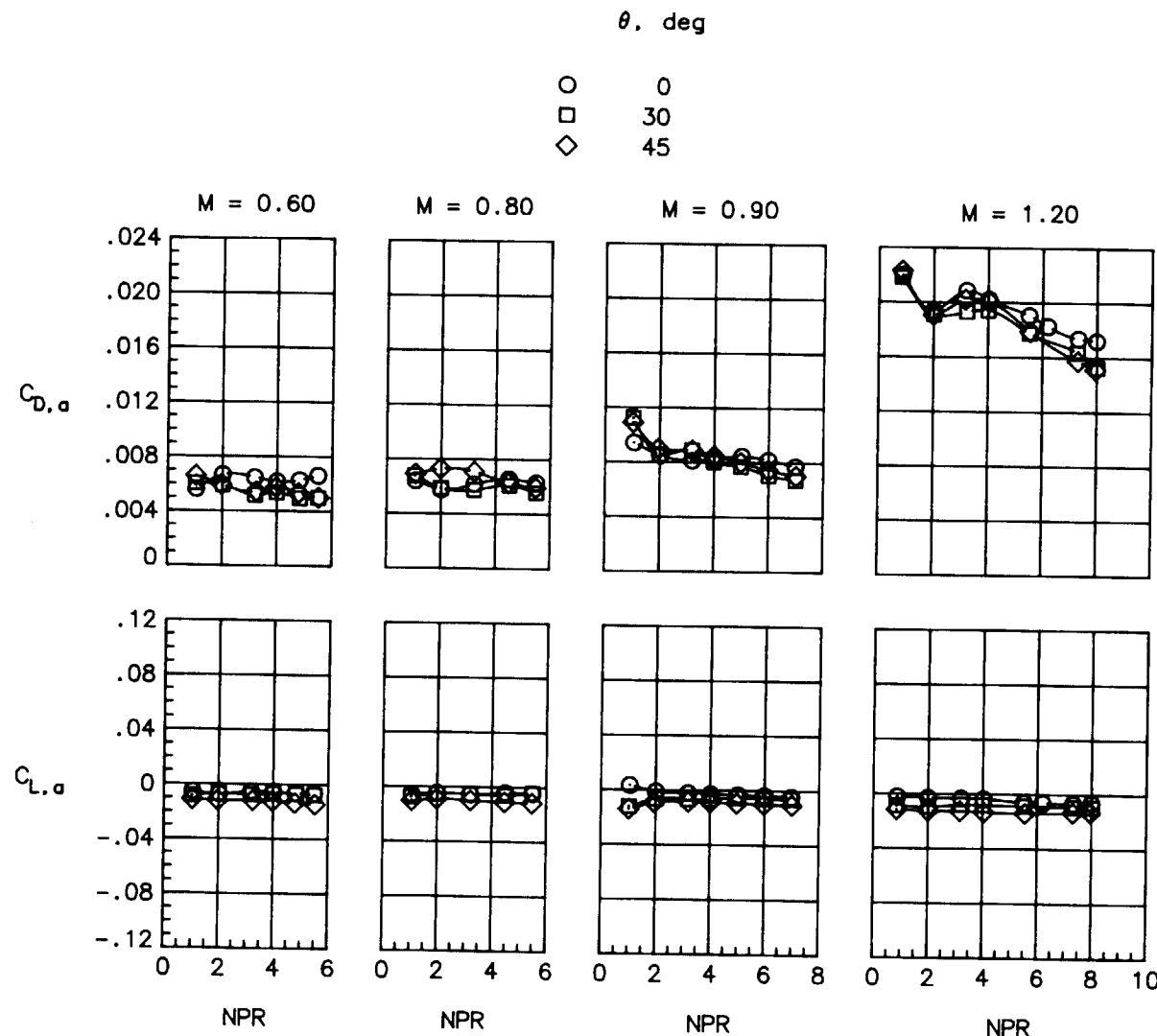
(c) $M = 0.90$.

Figure 25. Concluded.



(a) Aeropulsive performance.

Figure 26. Effect of nozzle cant angle on afterbody performance for standard flaps with $\delta_{v,p,l} = 0^\circ$, $\delta_{v,p,r} = 0^\circ$, and $\alpha = 0^\circ$.



(b) Afterbody lift and drag characteristics.

Figure 26. Concluded.

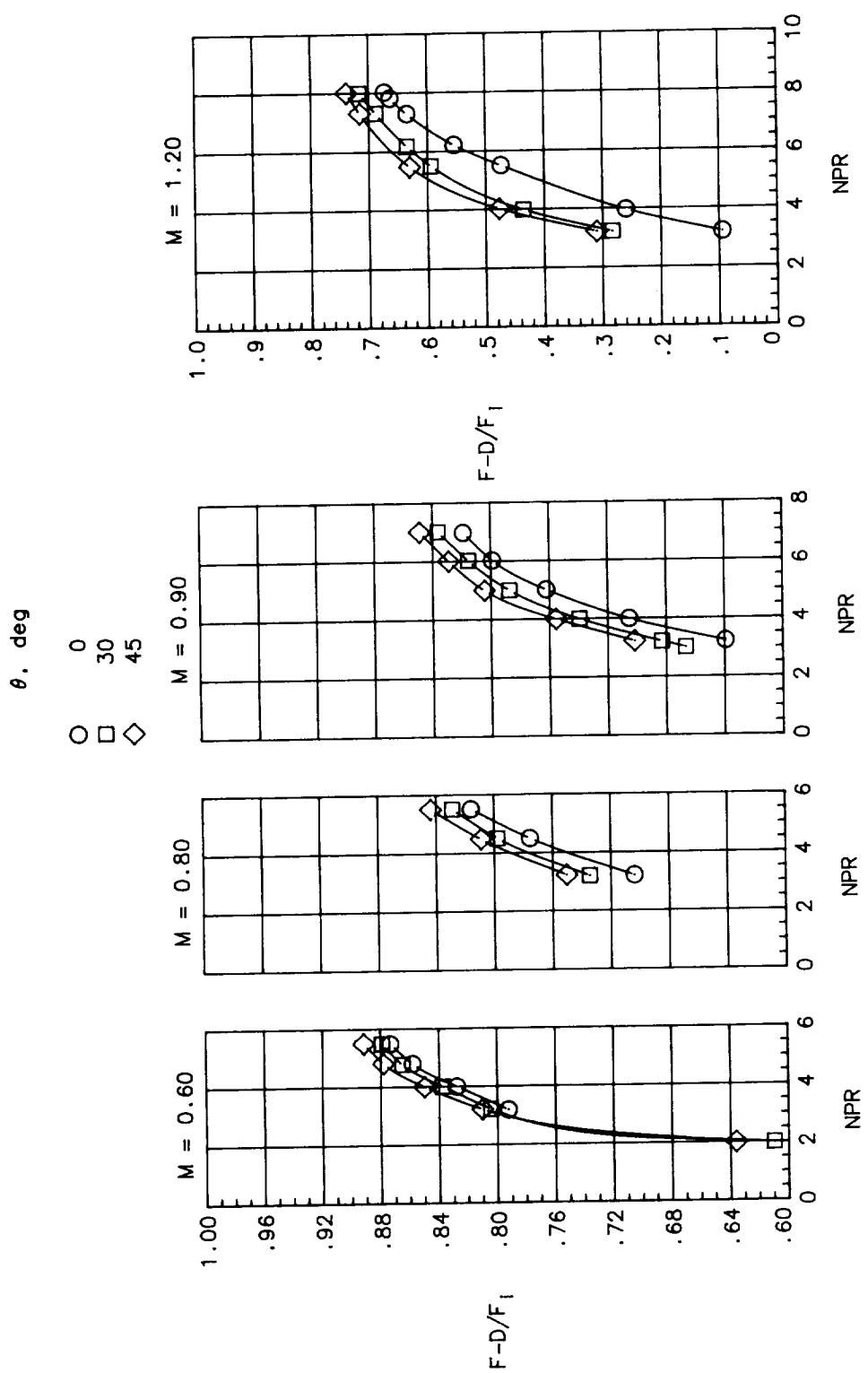
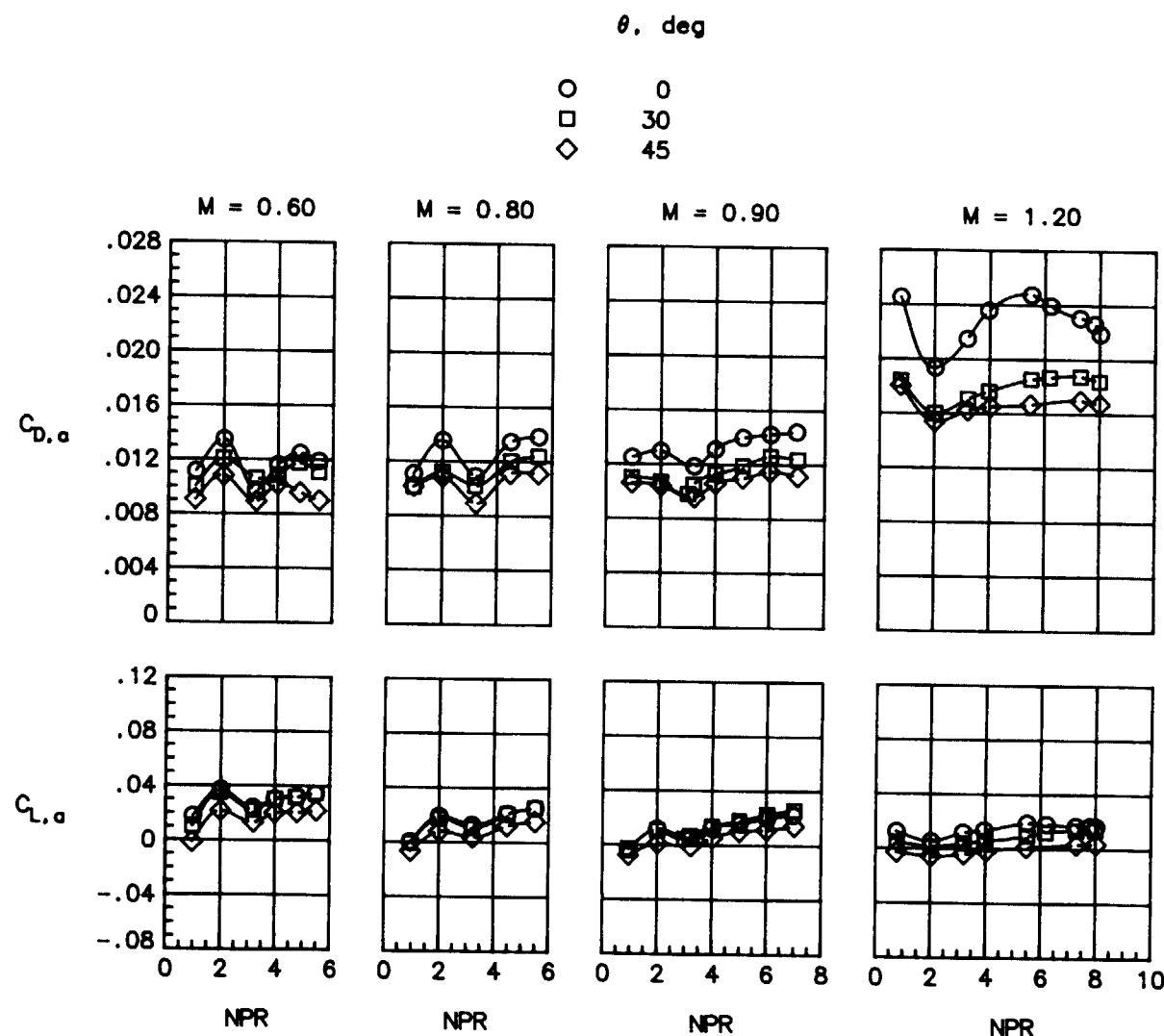


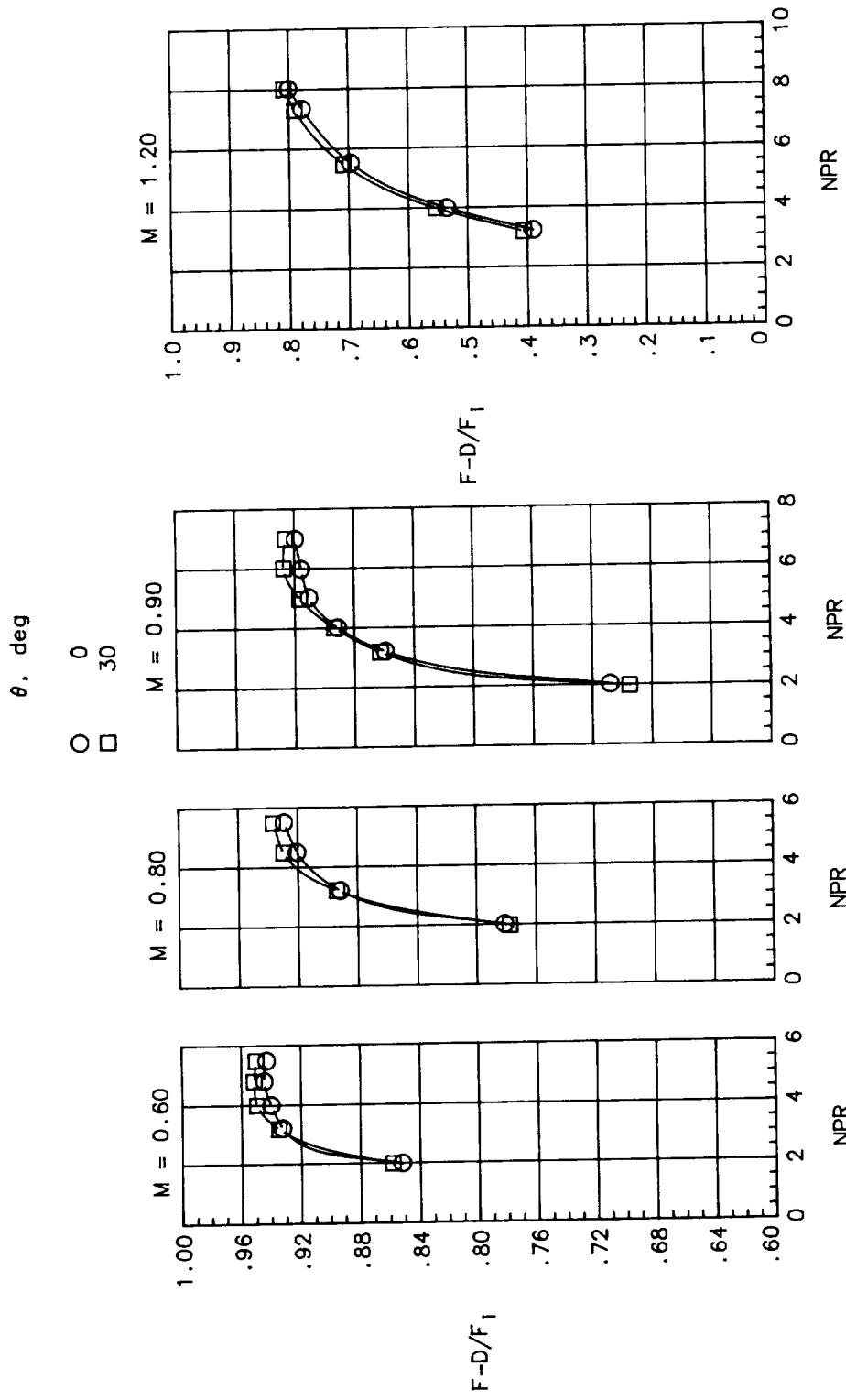
Figure 27. Effect of nozzle cant angle on afterbody performance for standard flaps with $\delta_{v,p,l} = 20^\circ$, $\delta_{v,p,r} = 20^\circ$, and $\alpha = 0^\circ$.

(a) Aeropropulsive performance.



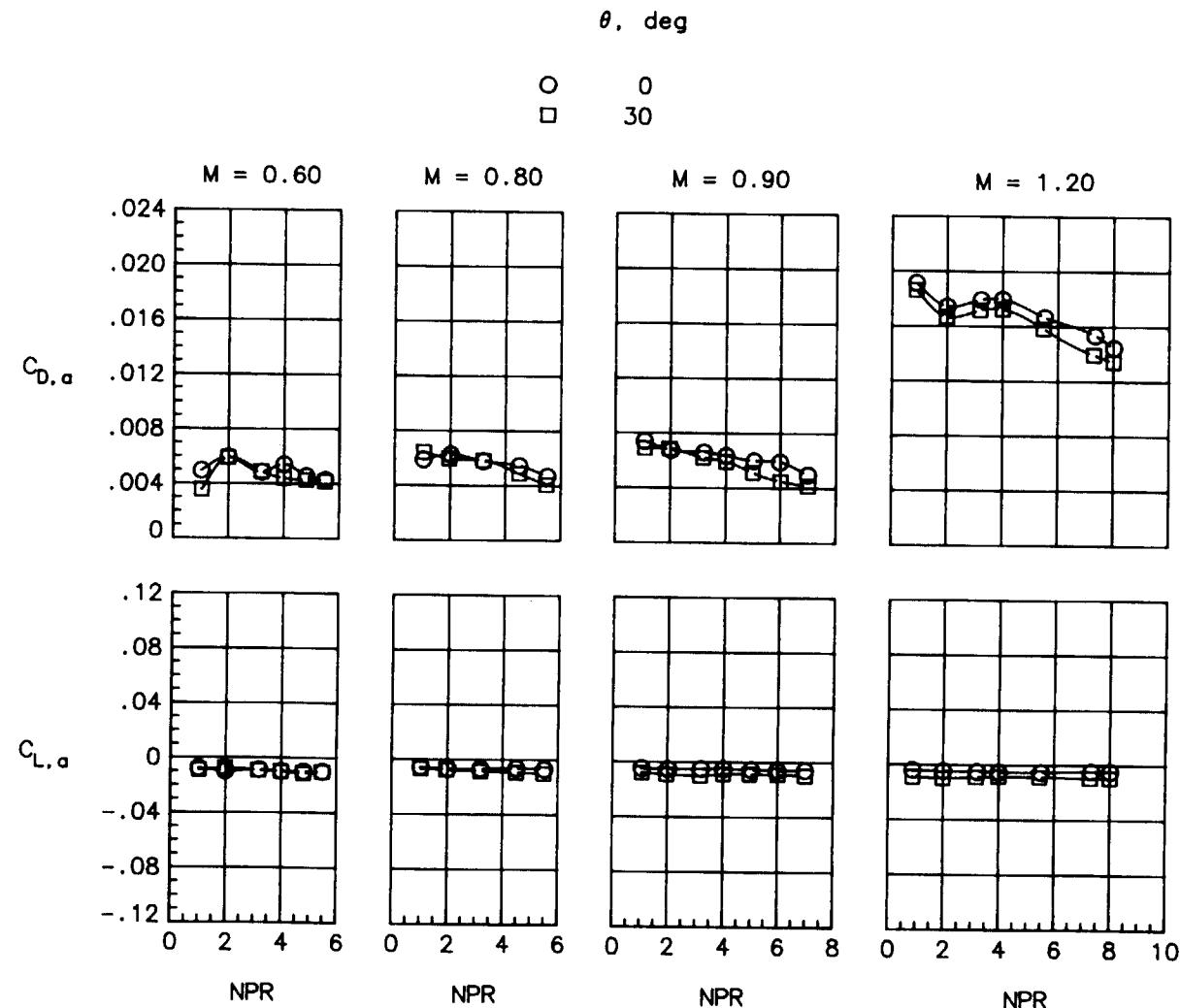
(b) Afterbody lift and drag characteristics.

Figure 27. Concluded.



(a) Aeropropulsive performance.

Figure 28. Effect of nozzle cant angle on afterbody performance for long flaps with $\delta_{v,p,l} = 0^\circ$, $\delta_{v,p,r} = 0^\circ$, and $\alpha = 0^\circ$.



(b) Afterbody lift and drag characteristics.

Figure 28. Concluded.

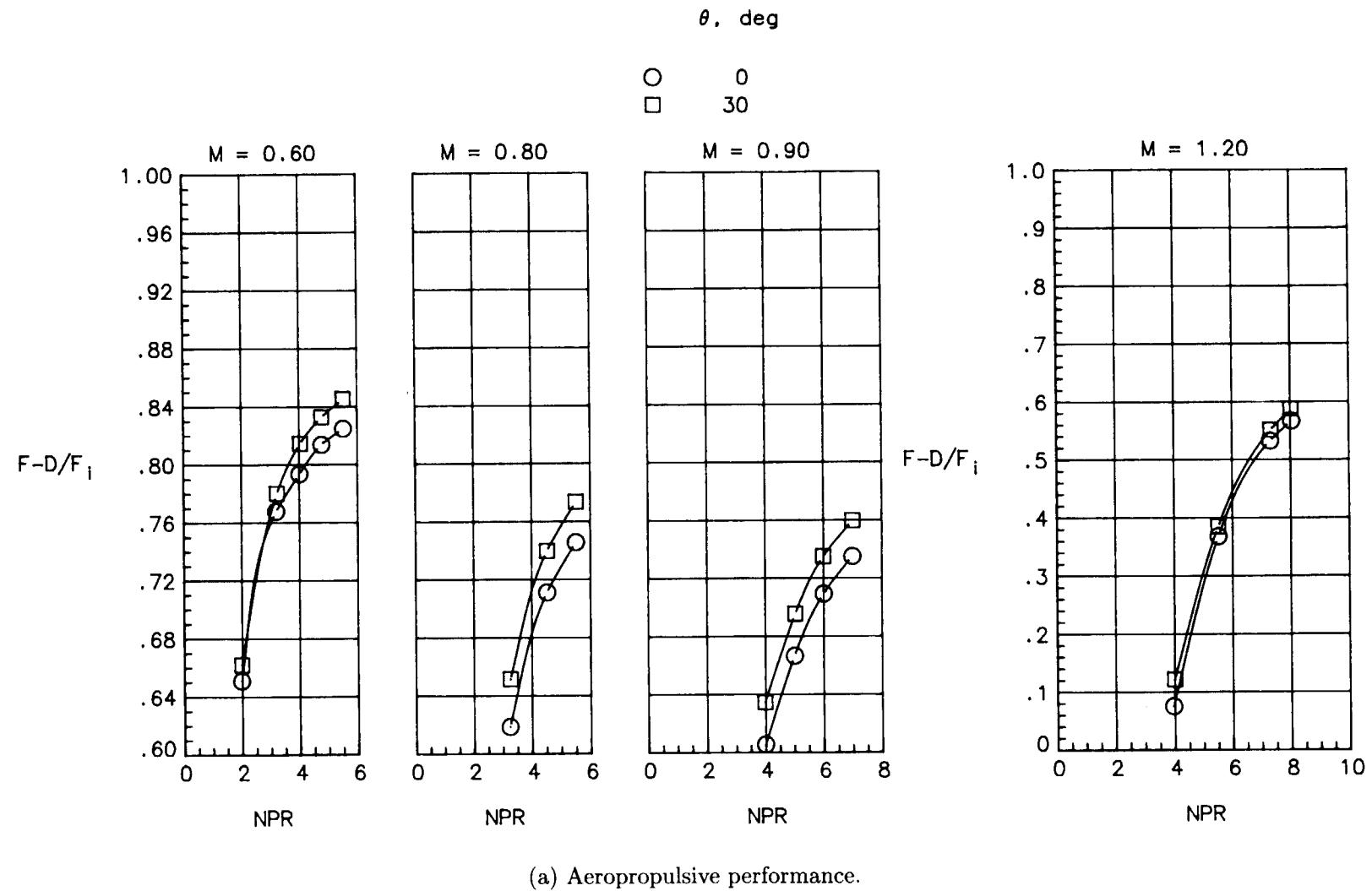
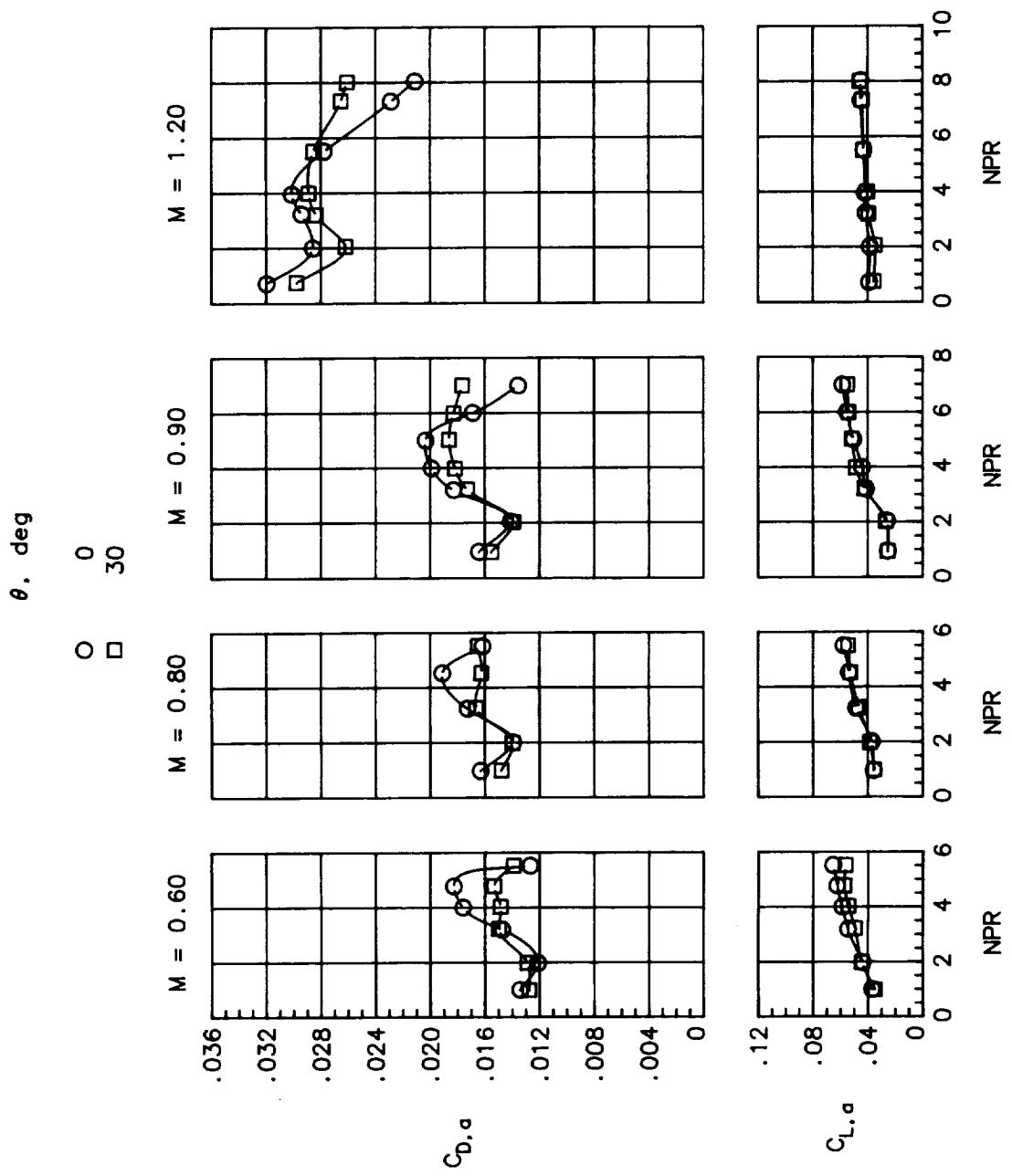


Figure 29. Effect of nozzle cant angle on afterbody performance for long flaps with $\delta_{v,p,l} = 20^\circ$, $\delta_{v,p,r} = 20^\circ$, and $\alpha = 0^\circ$.



(b) Afterbody lift and drag characteristics.

Figure 29. Concluded.

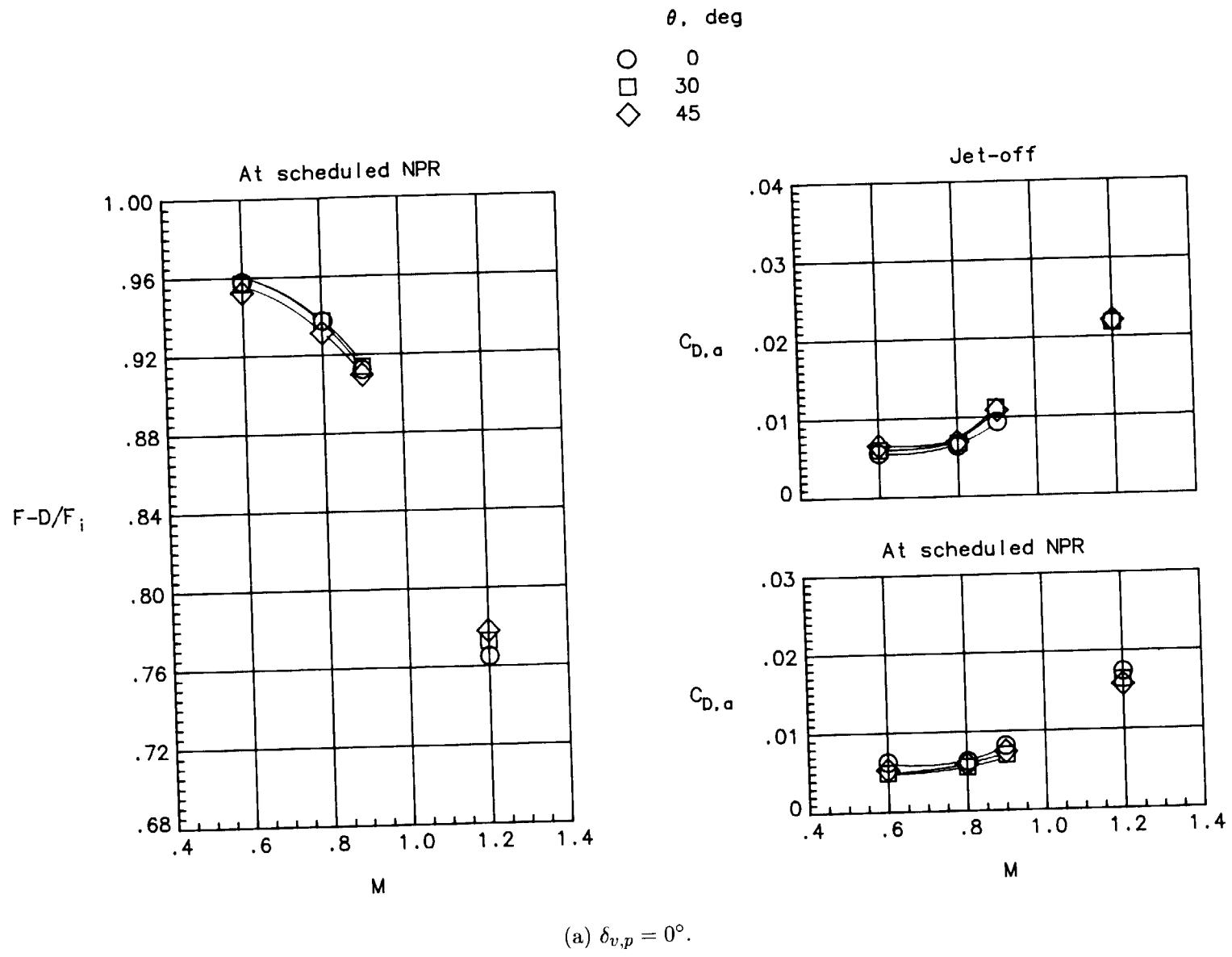


Figure 30. Summary of afterbody aeropropulsive performance for standard flaps with $\alpha = 0^\circ$.

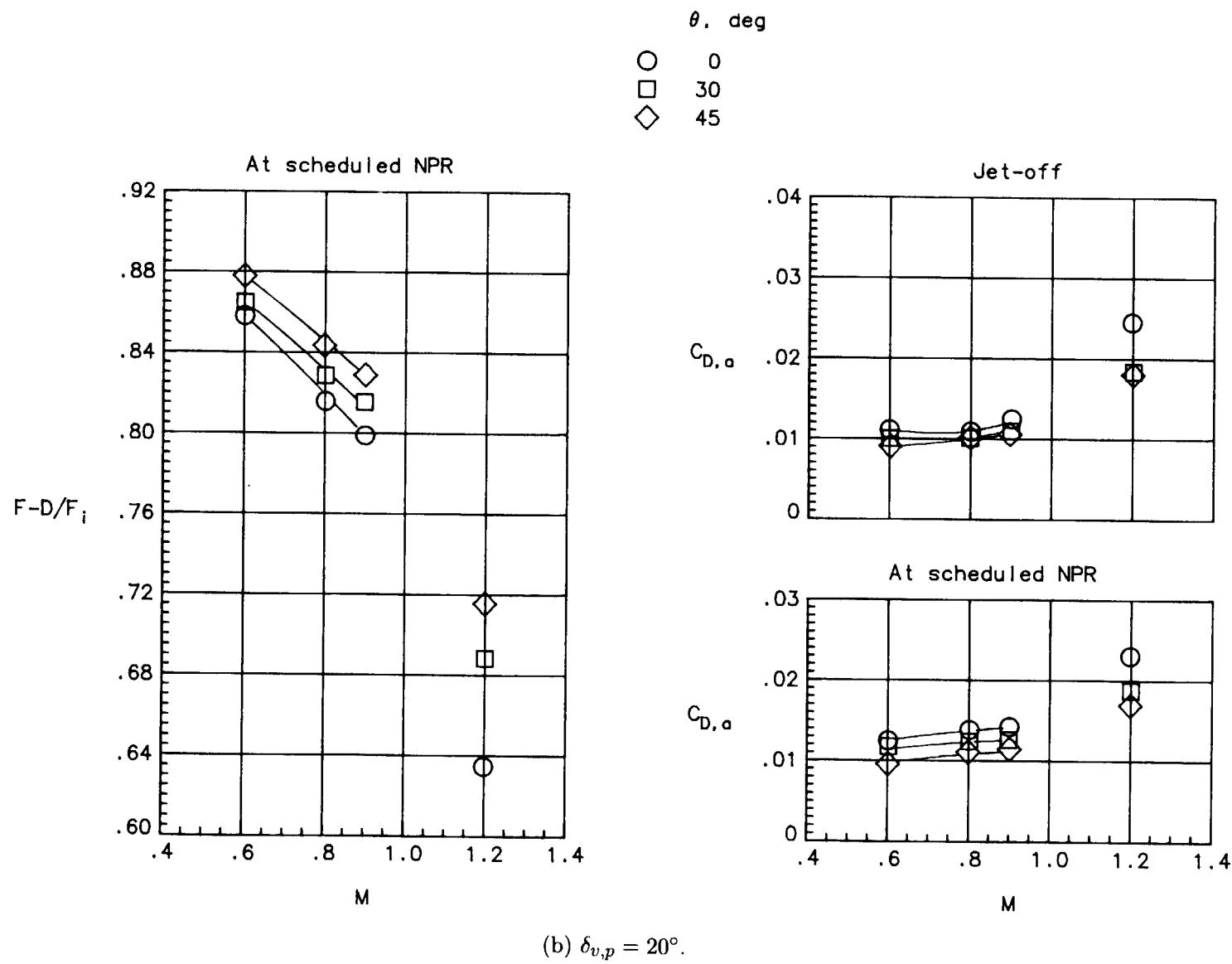


Figure 30. Concluded.

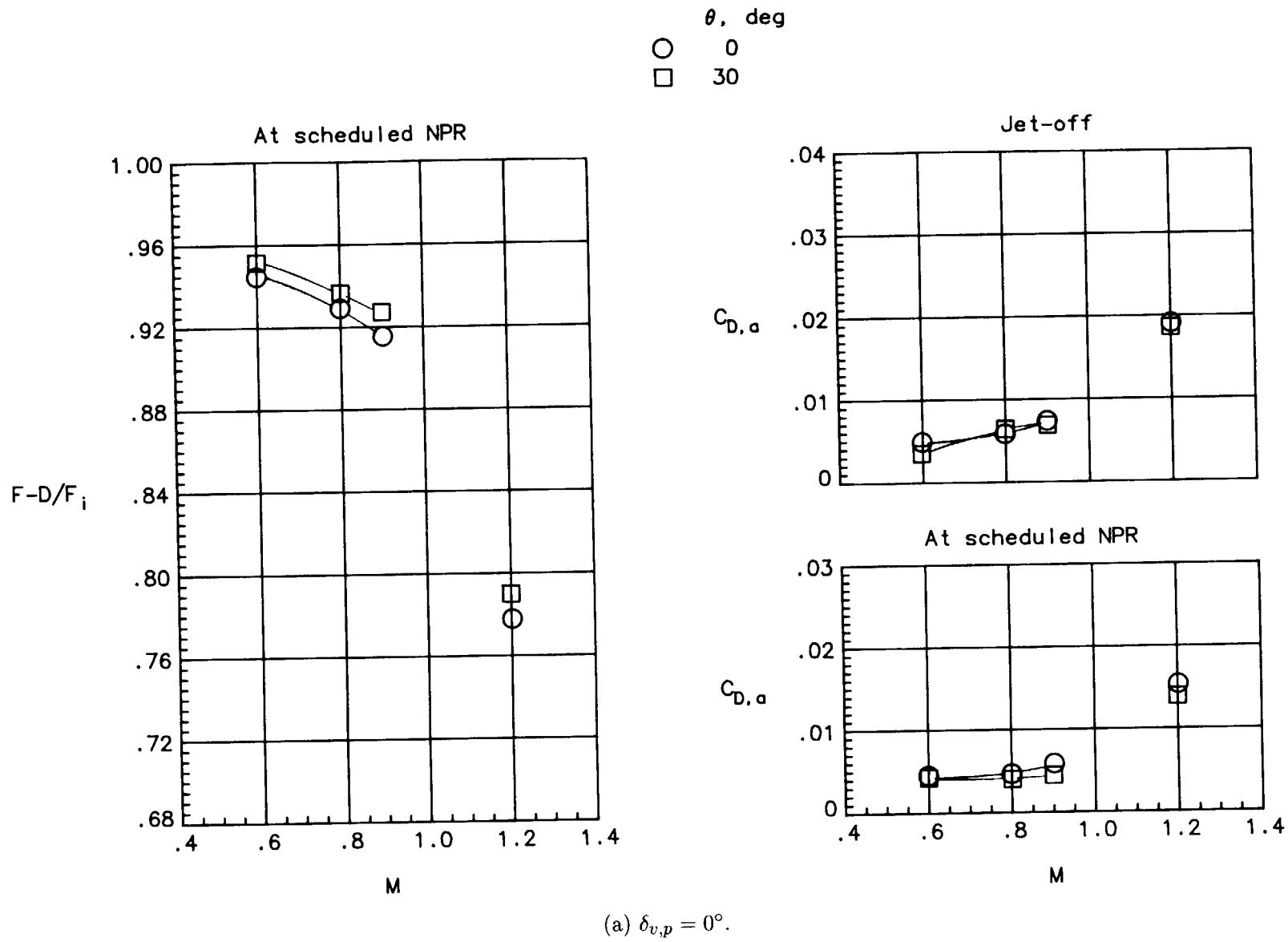


Figure 31. Summary of afterbody aeropropulsive performance for long flaps with $\alpha = 0^\circ$.

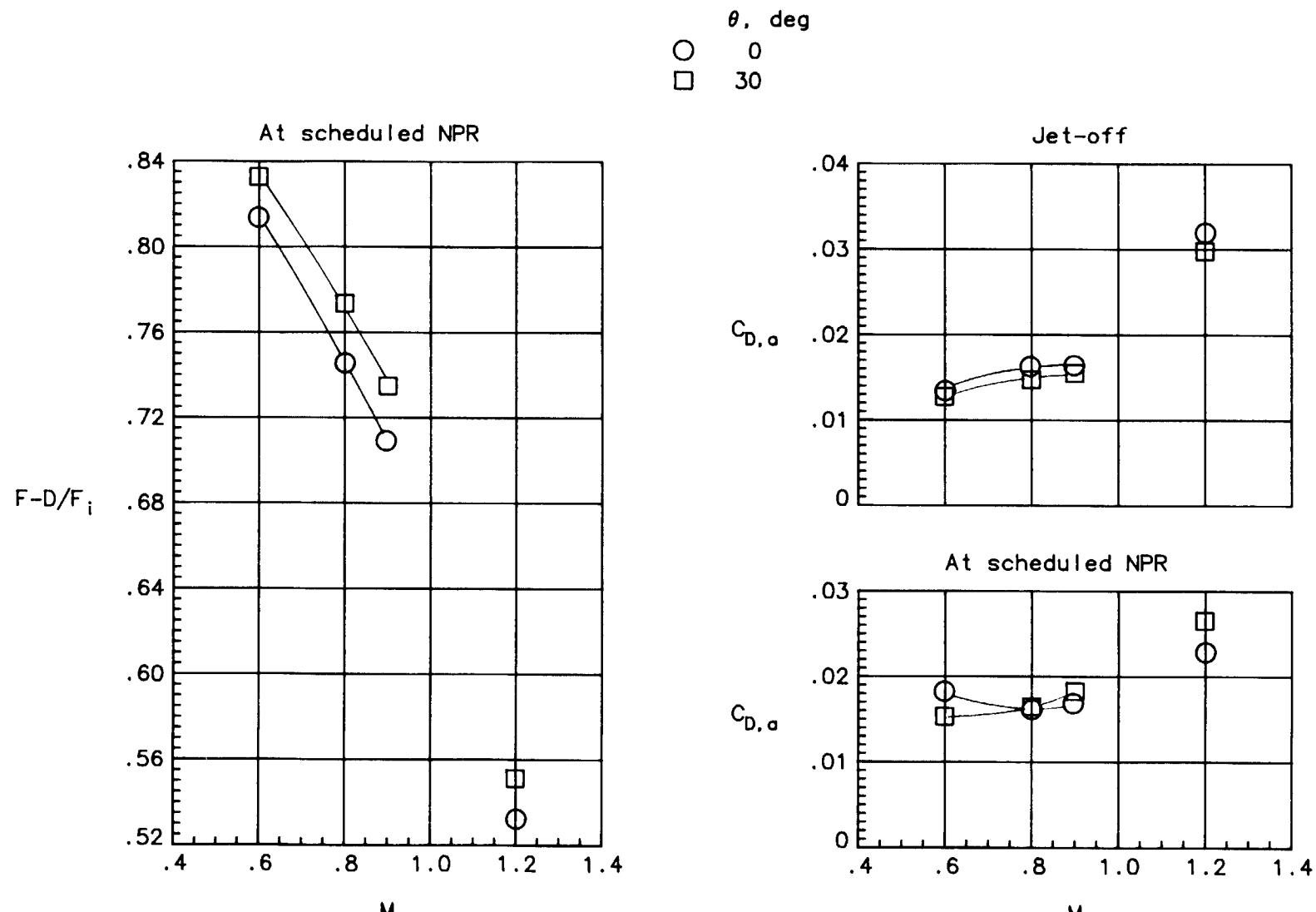
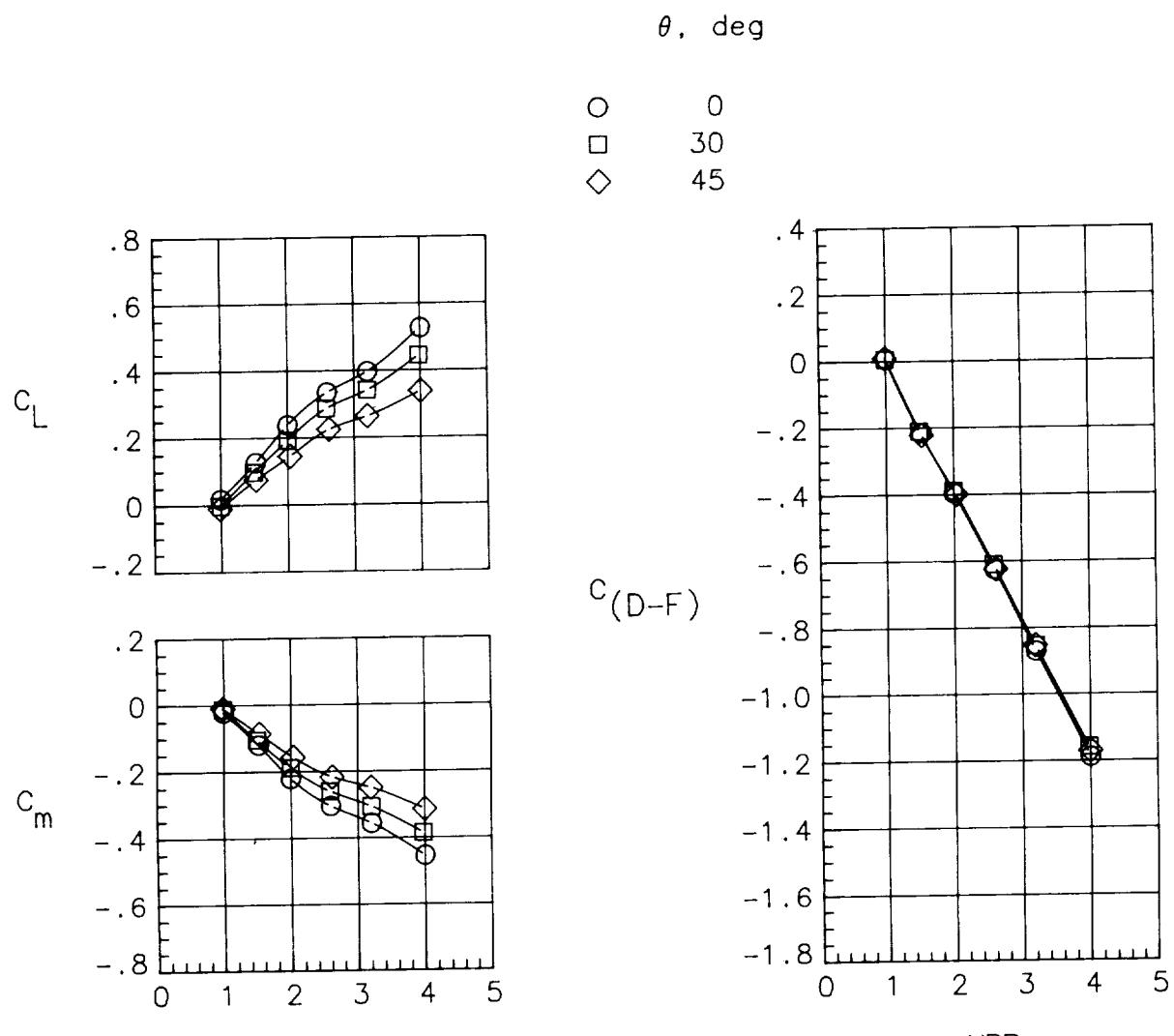
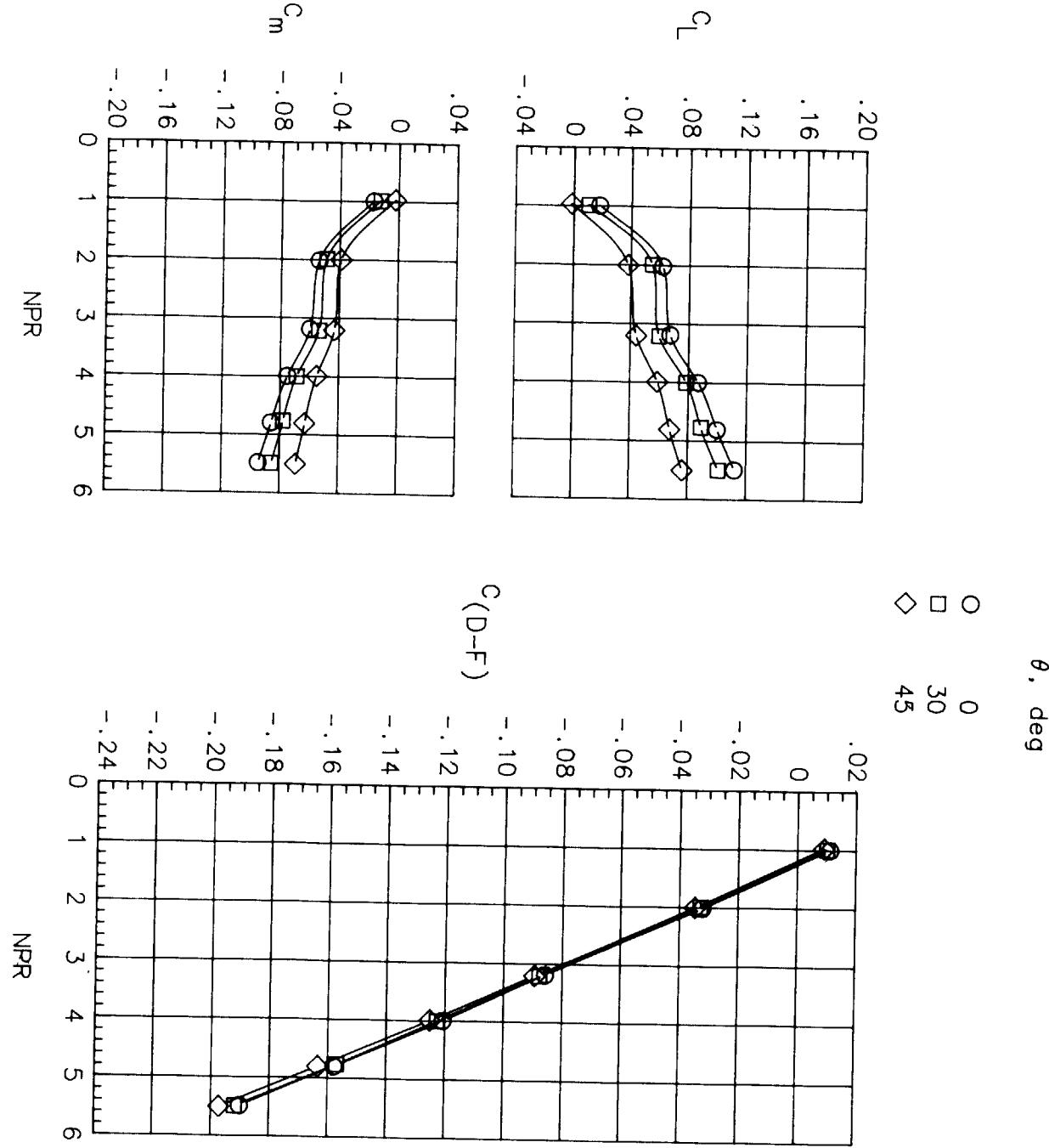
(b) $\delta_{v,p} = 20^\circ$.

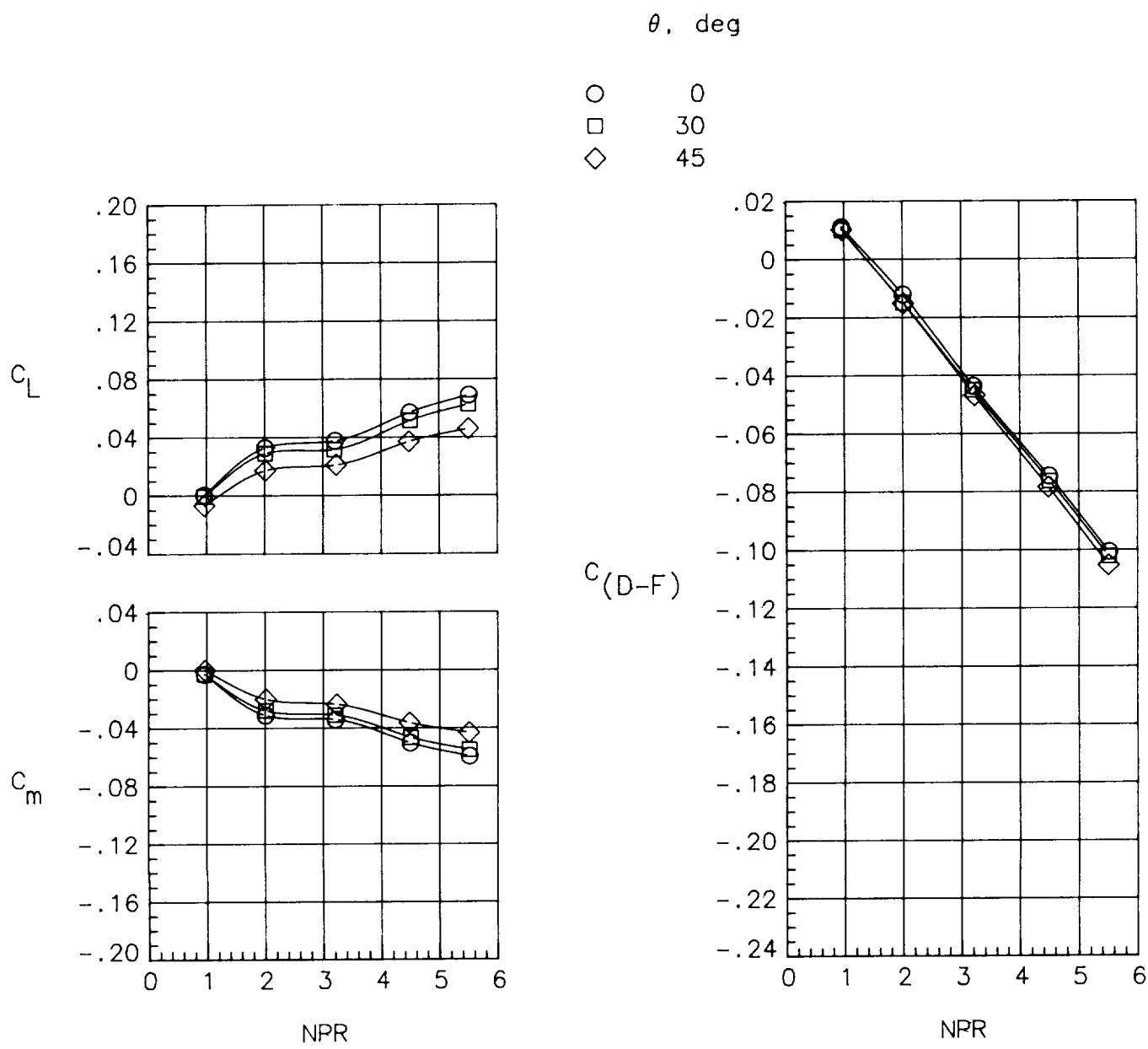
Figure 31. Concluded.



(a) $M = 0.20$.

Figure 32. Effect of nozzle cant angle on total longitudinal aerodynamic characteristics for standard flaps with $\delta_{v,p,l} = 20^\circ$, $\delta_{v,p,r} = 20^\circ$, and $\alpha = 0^\circ$.





(c) $M = 0.80$.

Figure 32. Continued.

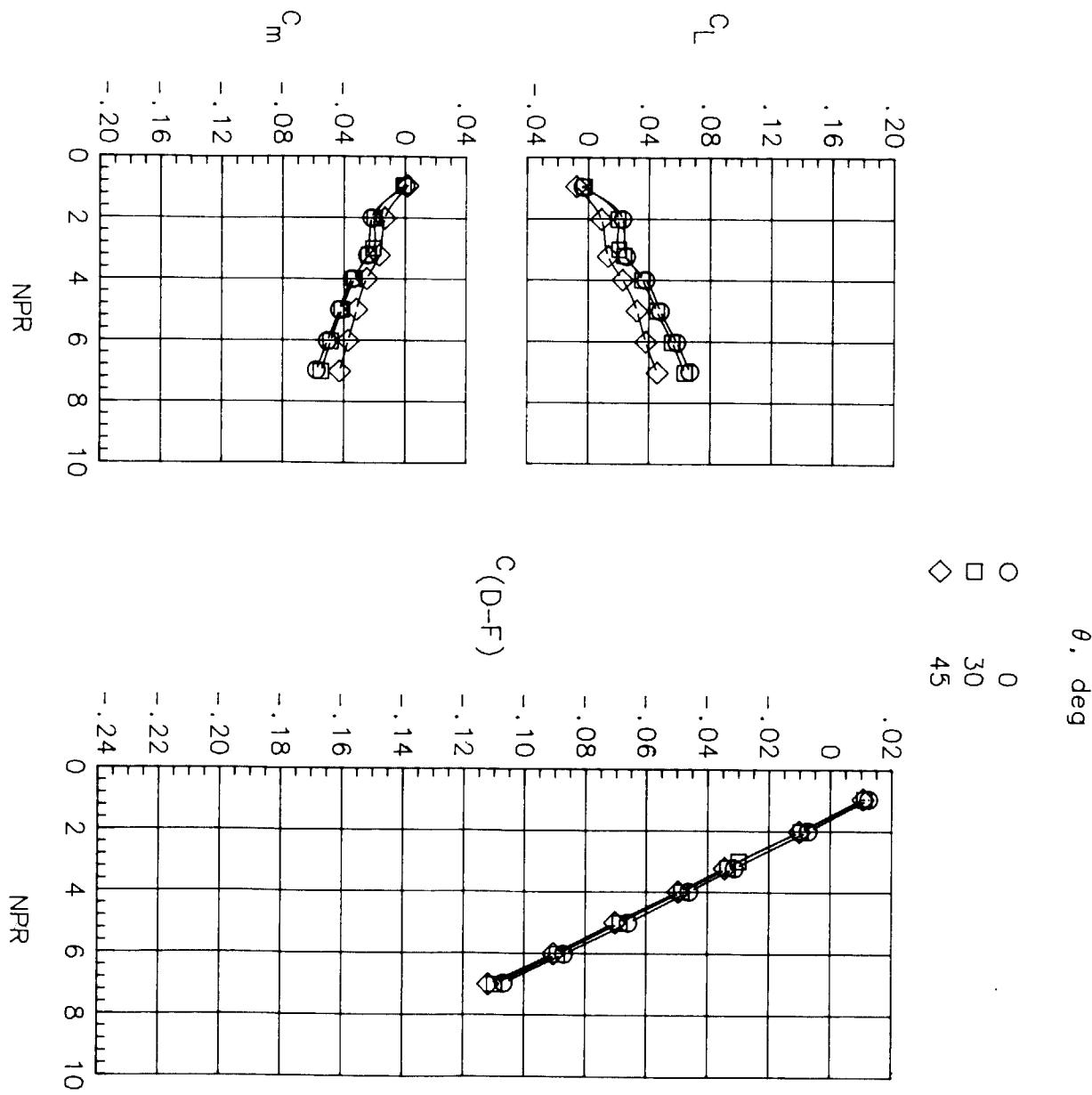
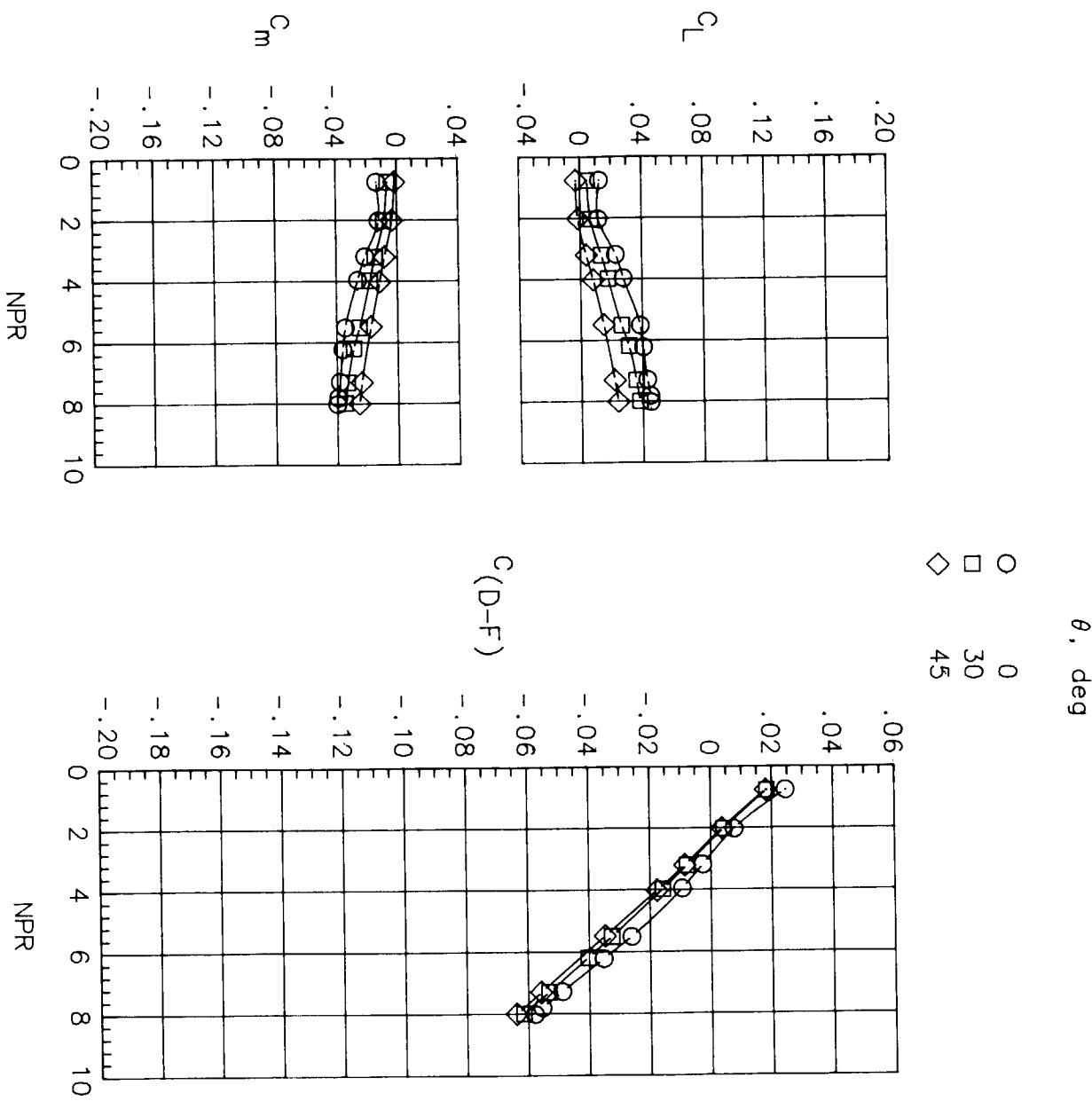
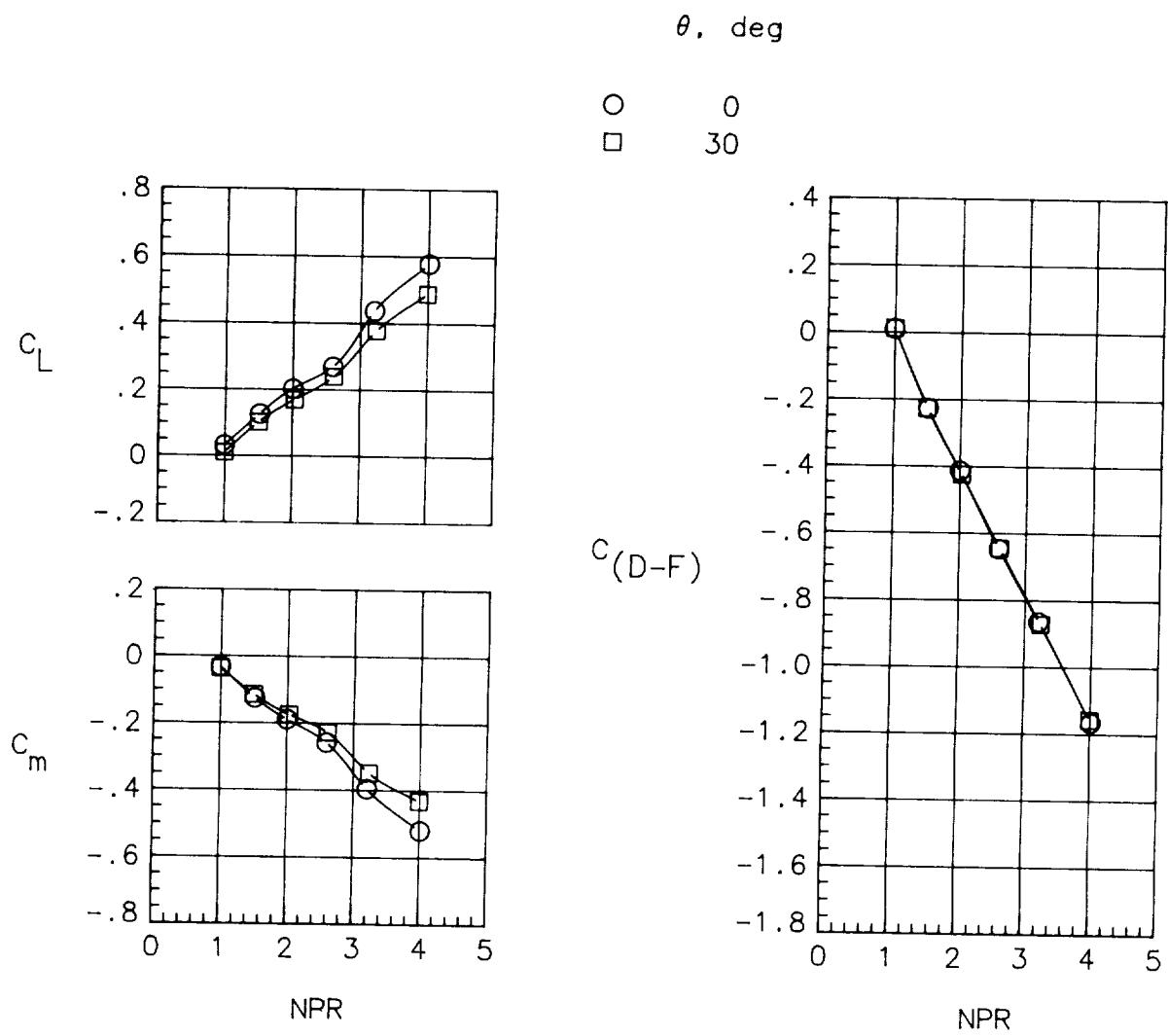
(d) $M = 0.90$.

Figure 32. Continued.



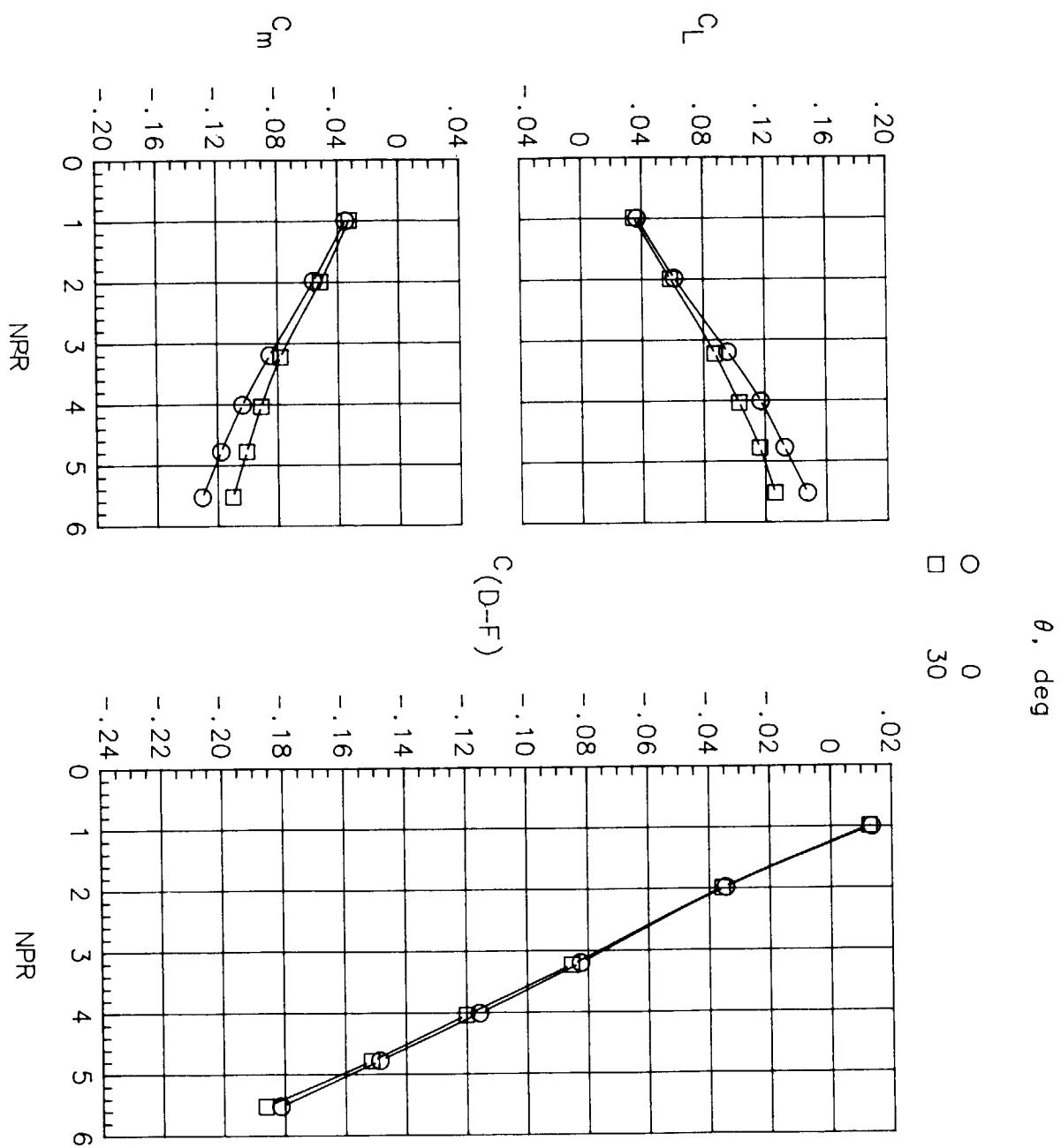
(e) $M = 1.20$.

Figure 32. Concluded.



(a) $M = 0.20$.

Figure 33. Effect of cant angle on total longitudinal aerodynamic characteristics for long flaps with $\delta_{v,p,l} = 20^\circ$, $\delta_{v,p,r} = 20^\circ$, and $\alpha = 0^\circ$.



(b) $M = 0.60$.

Figure 33. Continued.

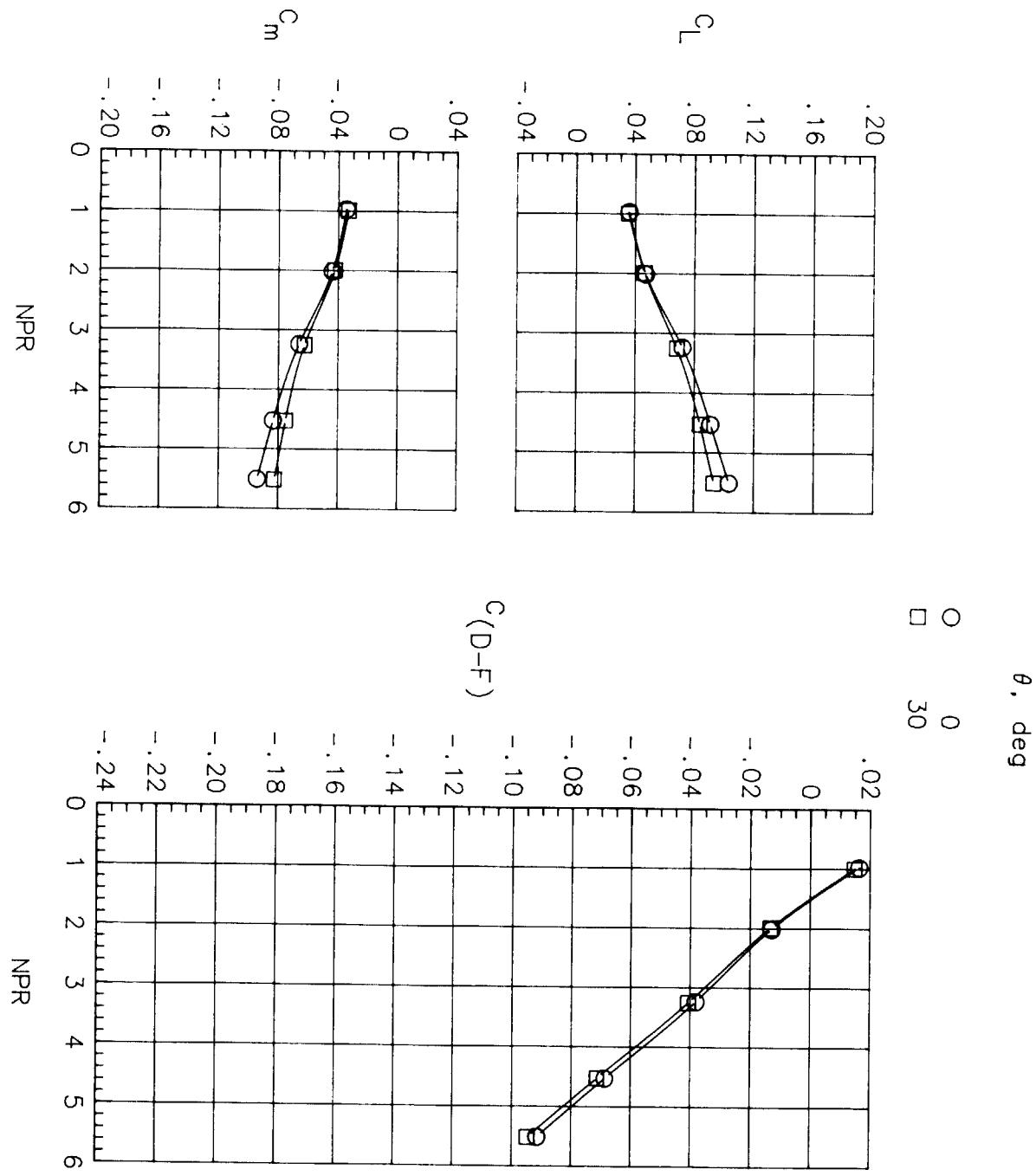
(c) $M = 0.80$.

Figure 33. Continued.

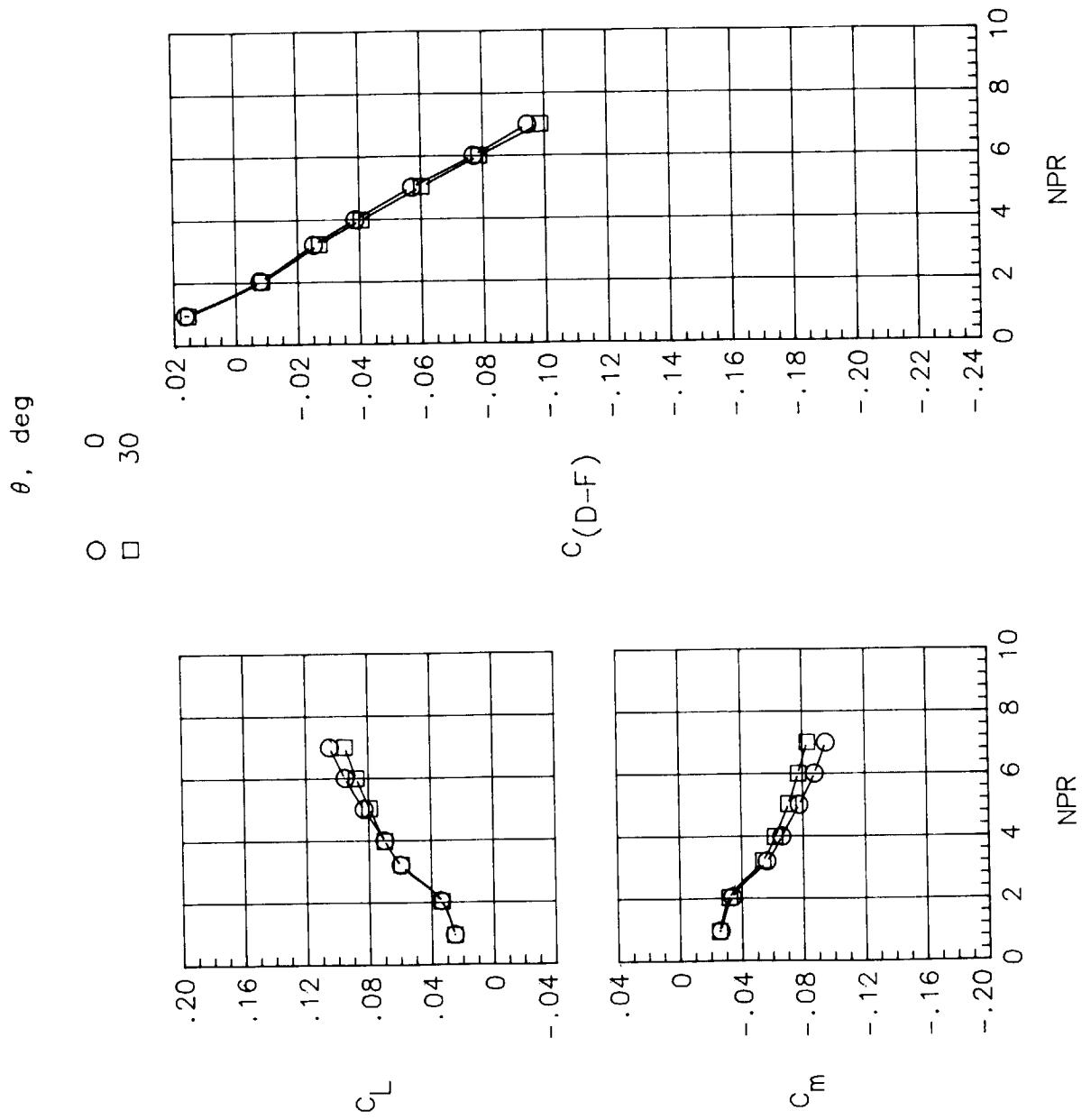
(d) $M = 0.90$.

Figure 33. Continued.

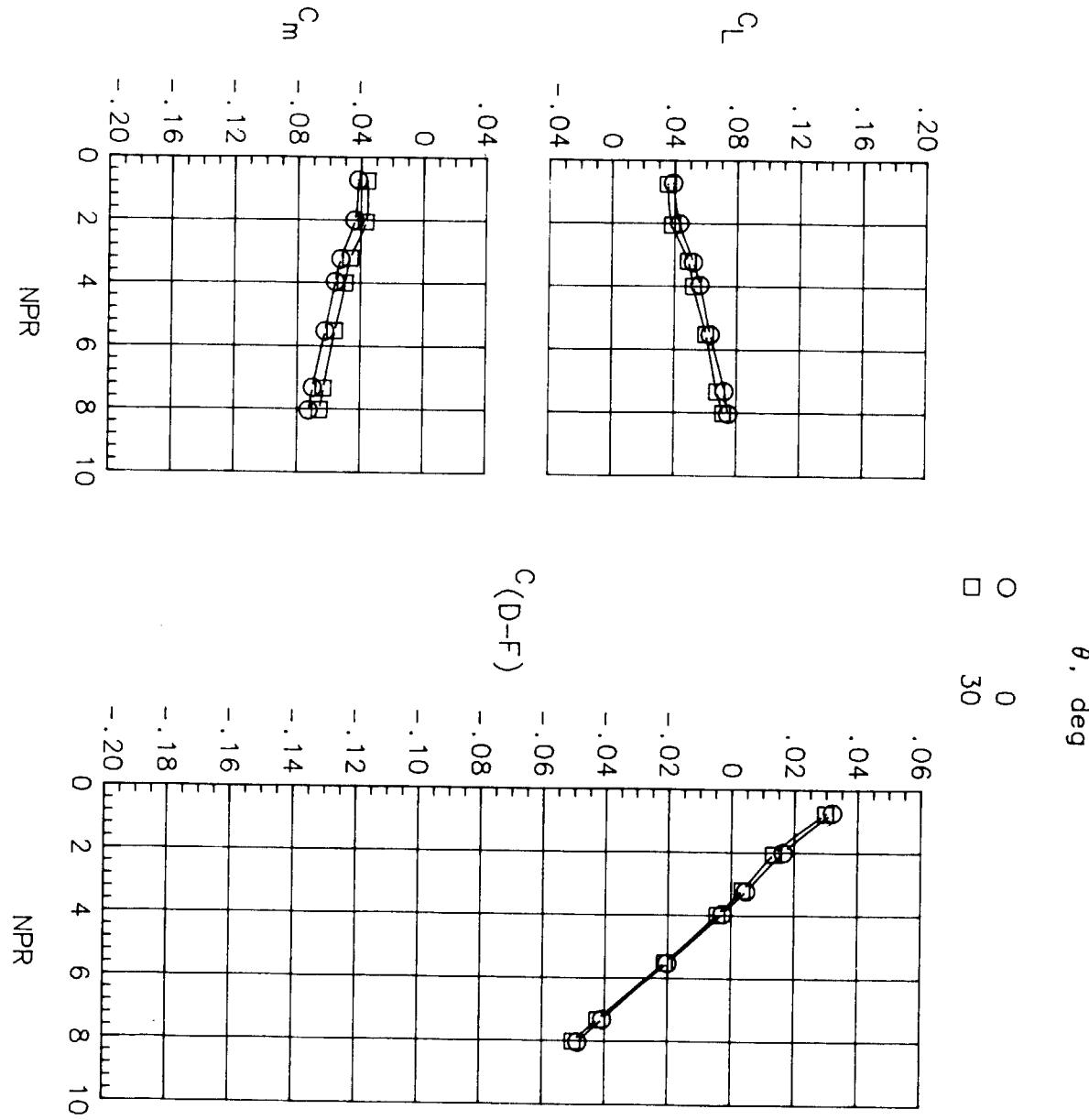
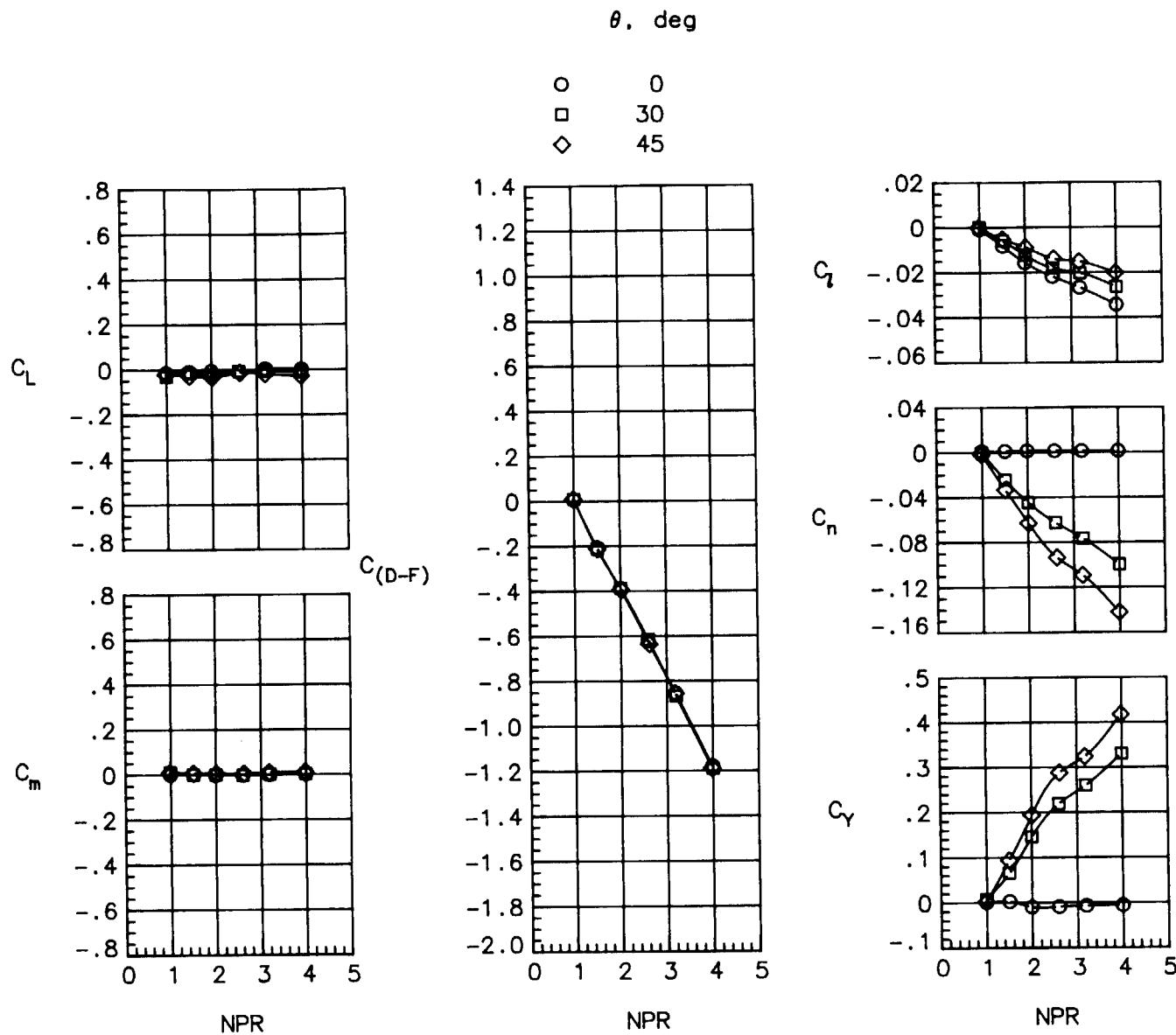
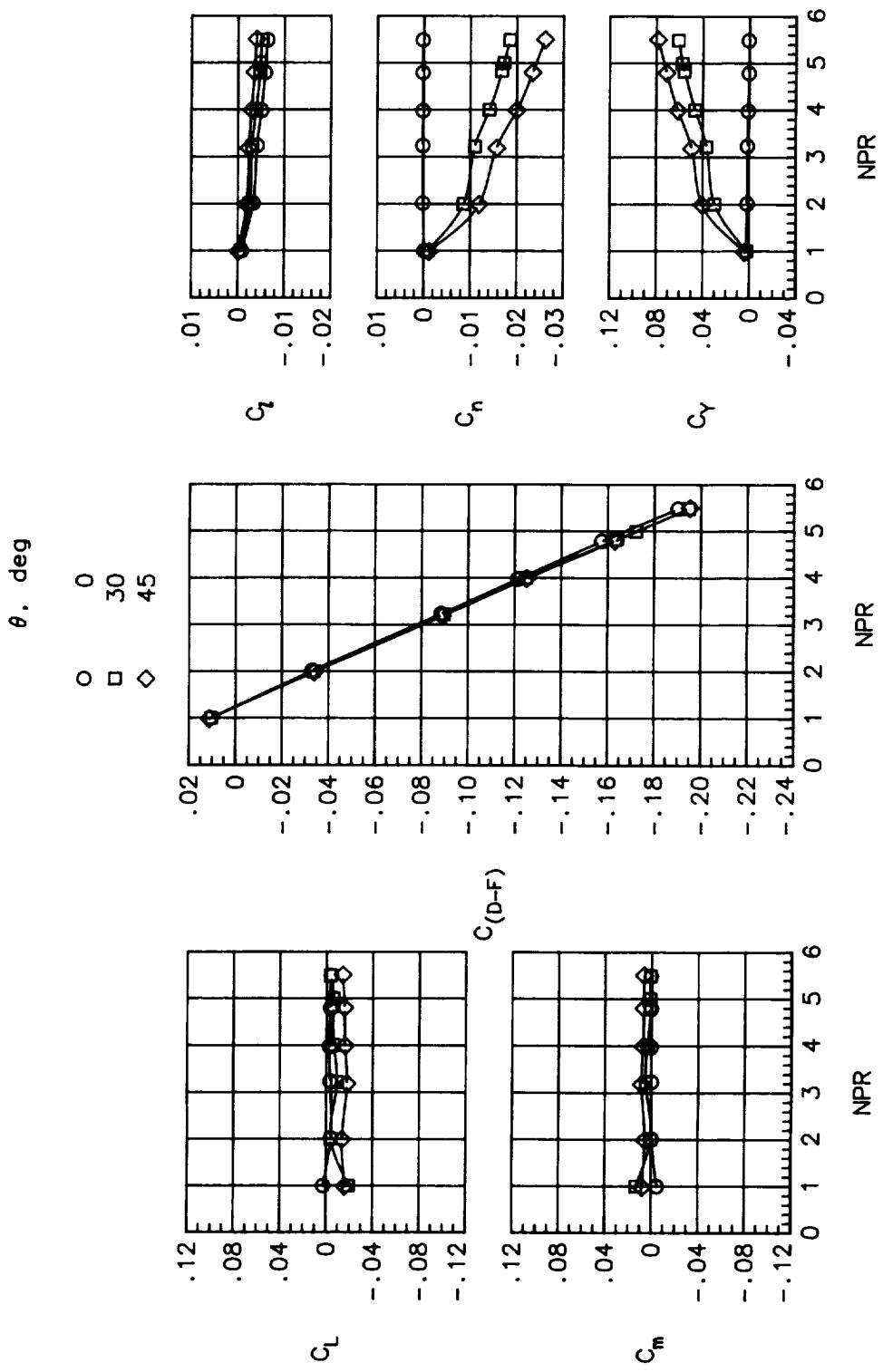
(e) $M = 1.20$.

Figure 33. Concluded.



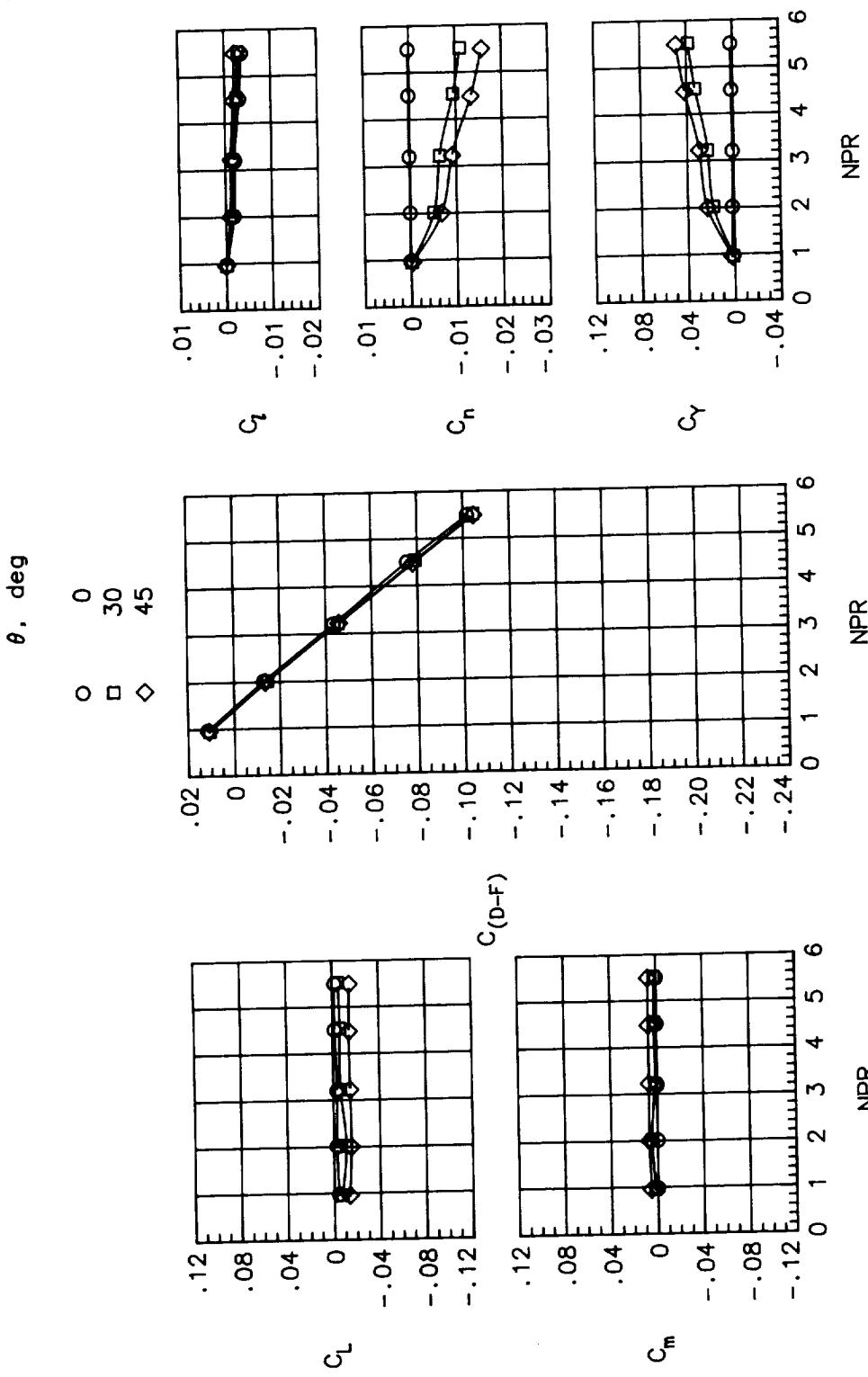
(a) $M = 0.20$.

Figure 34. Effect of nozzle cant angle on total longitudinal aerodynamic characteristics for standard flaps with $\delta_{v,p,l} = -20^\circ$, $\delta_{v,p,r} = 20^\circ$, and $\alpha = 0^\circ$.



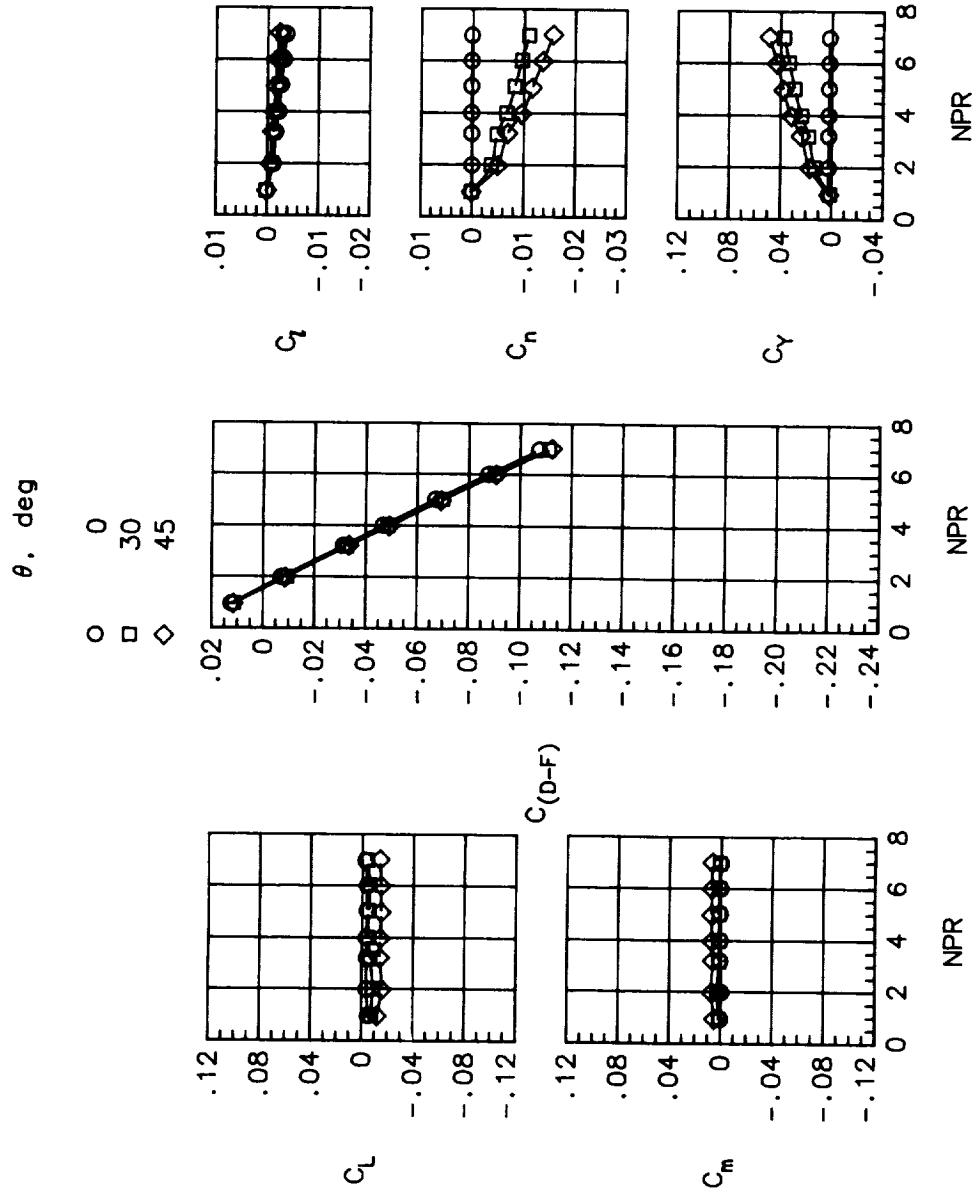
(b) $M = 0.60$.

Figure 34. Continued.



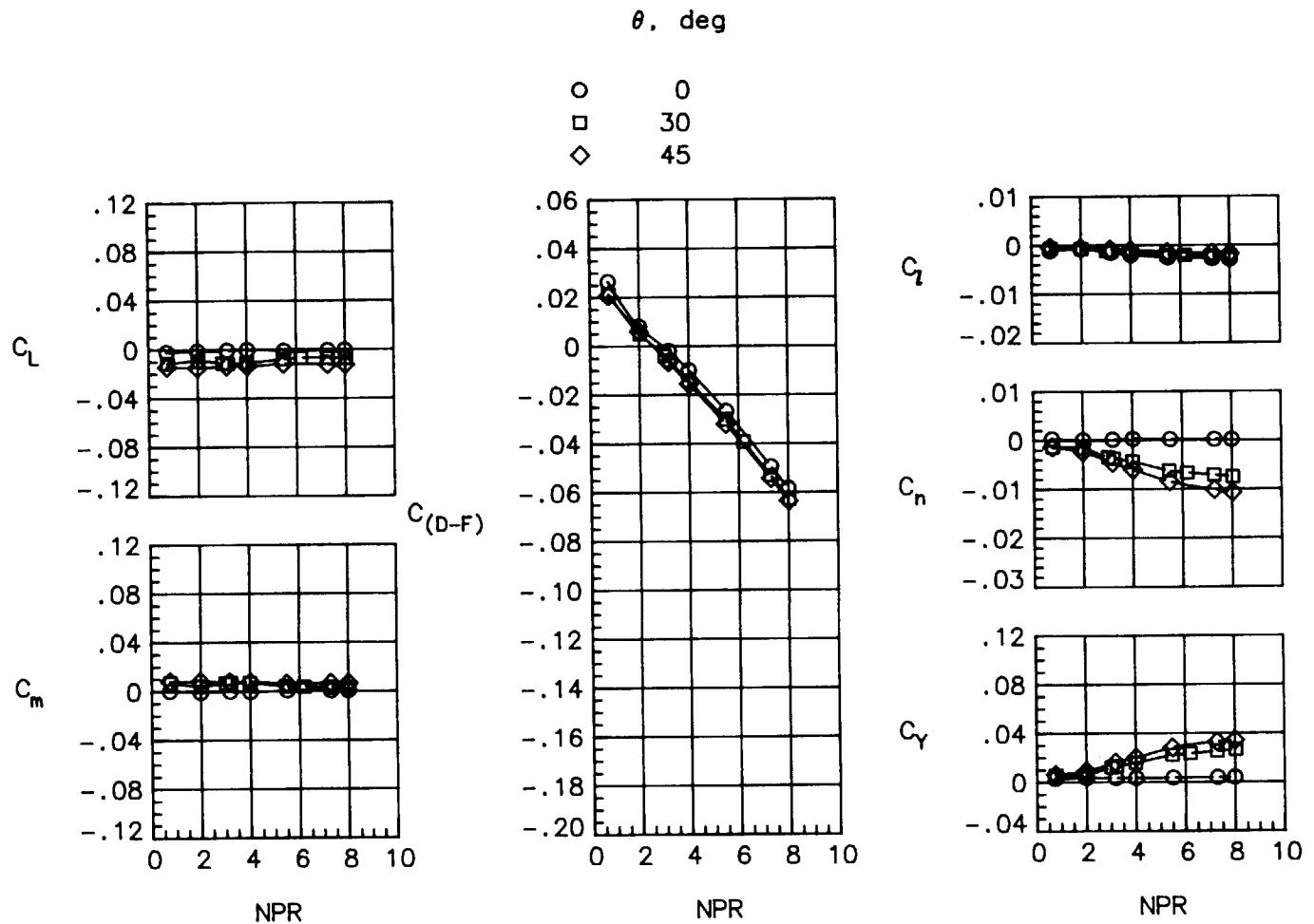
(c) $M = 0.80$.

Figure 34. Continued.



(d) $M = 0.90$.

Figure 34. Continued.



(e) $M = 1.20$.

Figure 34. Concluded.

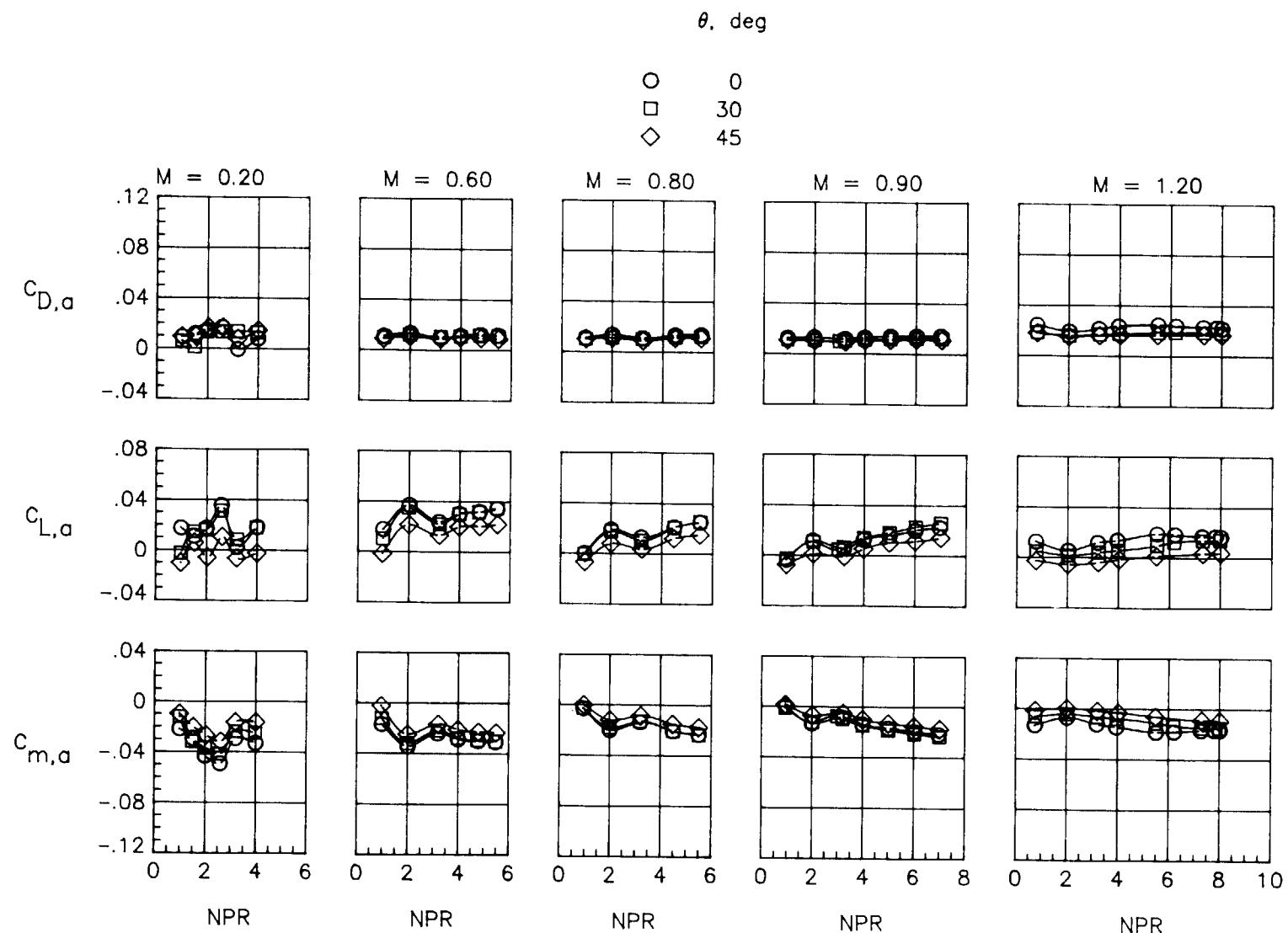


Figure 35. Effect of nozzle cant angle on thrust-removed longitudinal aerodynamic characteristics for standard flaps with $\delta_{v,p,l} = 20^\circ$, $\delta_{v,p,r} = 20^\circ$, and $\alpha = 0^\circ$.

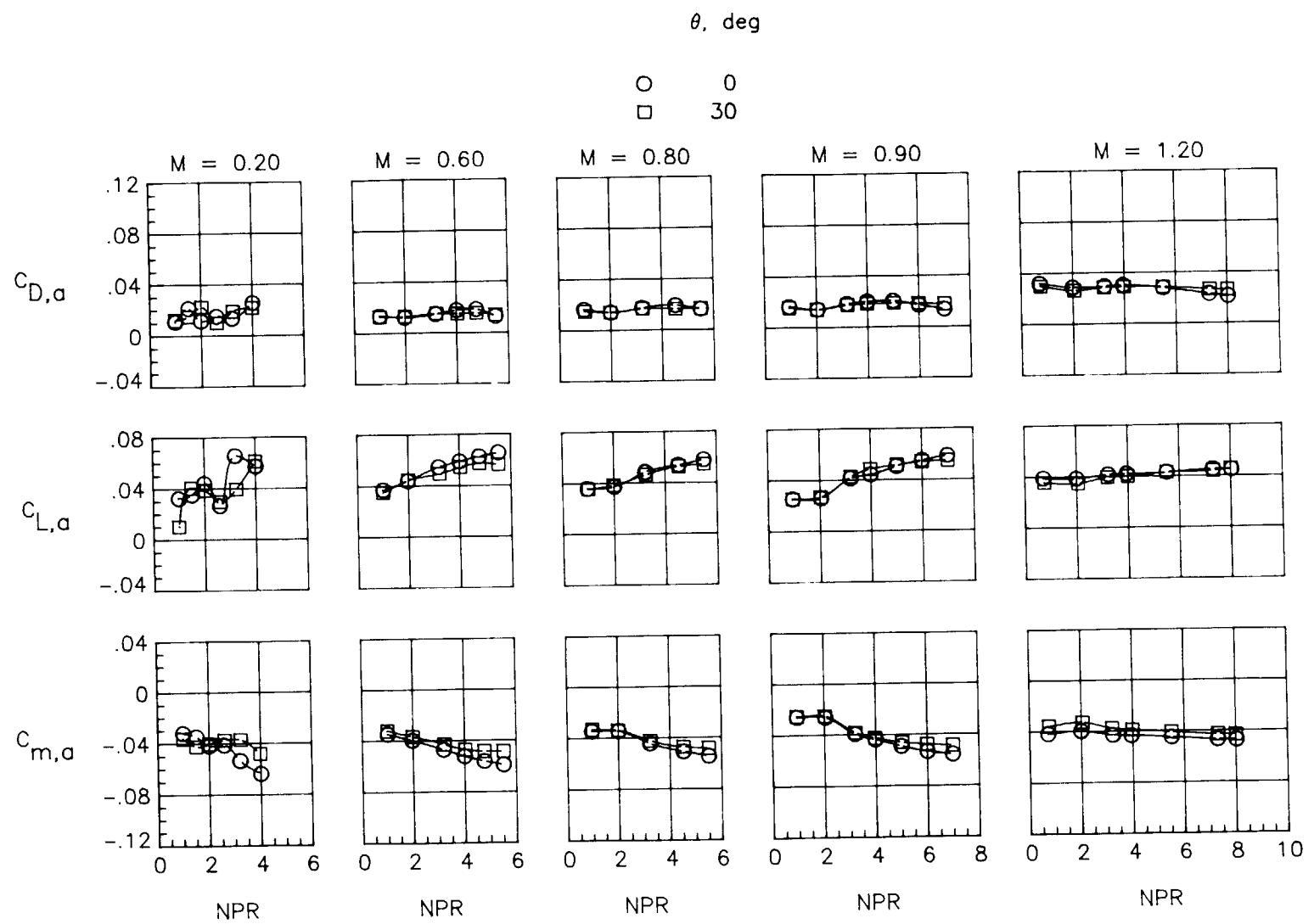
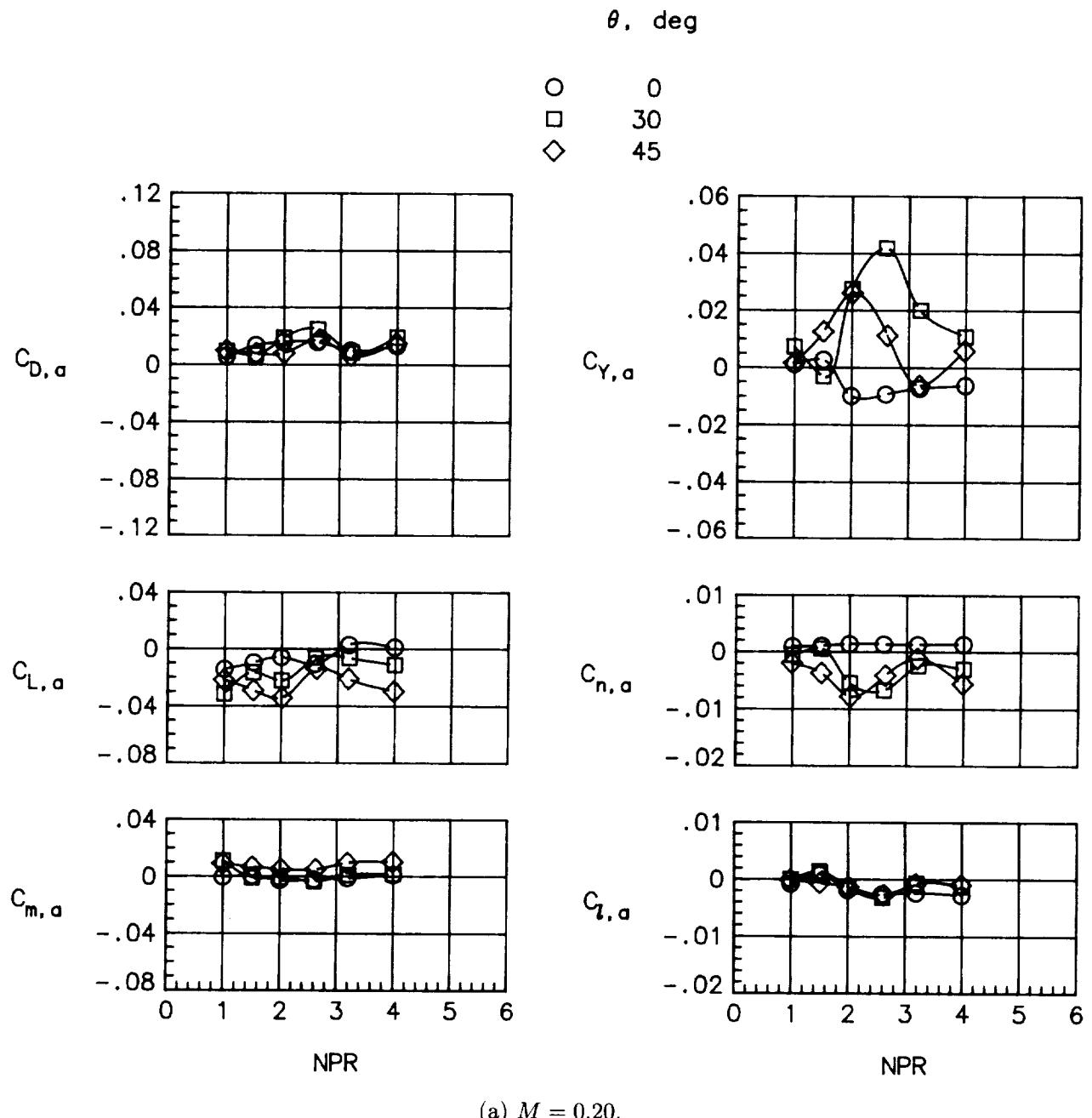
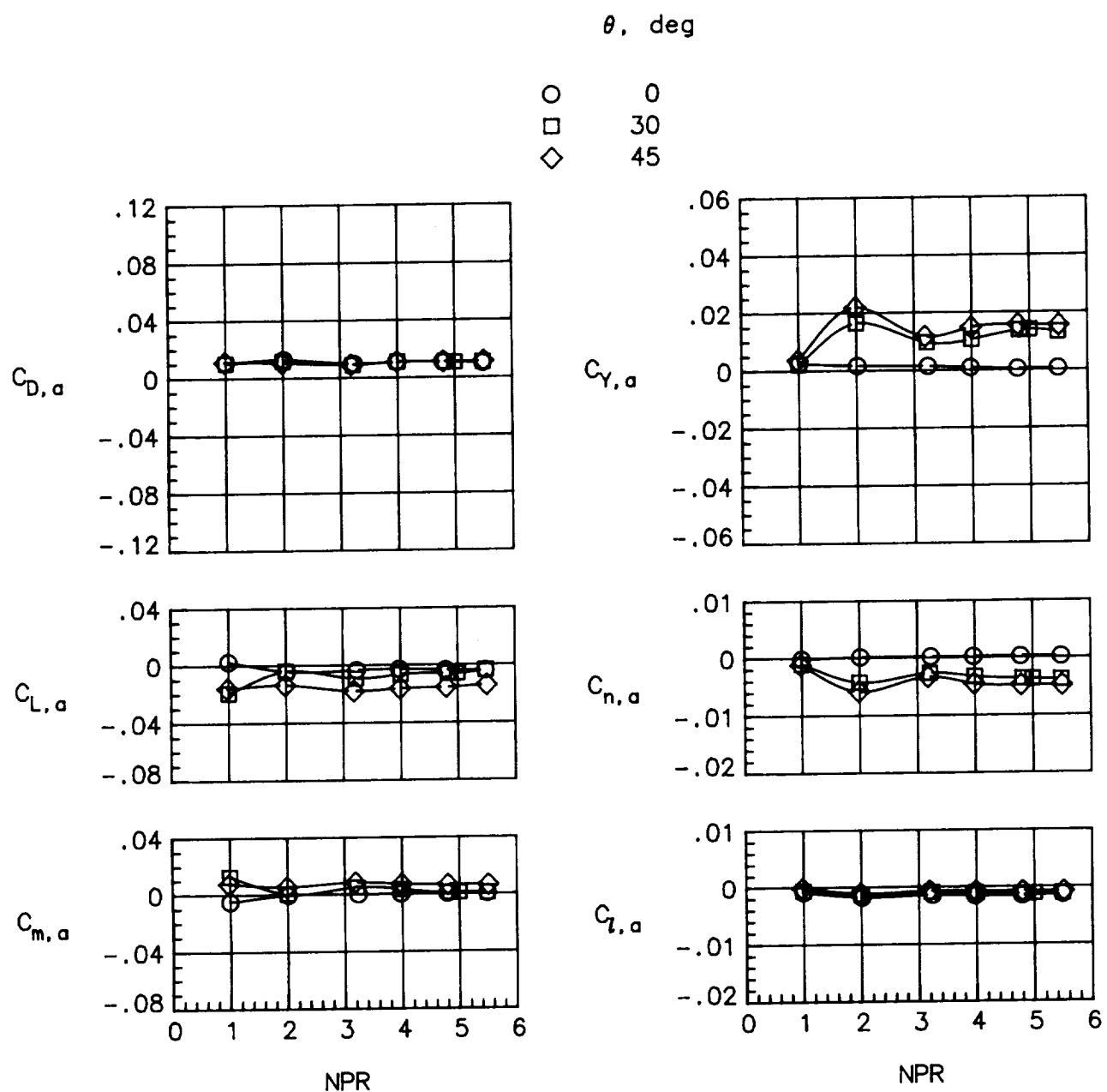


Figure 36. Effect of nozzle cant angle on thrust-removed longitudinal aerodynamic characteristics for long flaps with $\delta_{v,p,l} = 20^\circ$, $\delta_{v,p,r} = 20^\circ$, and $\alpha = 0^\circ$.



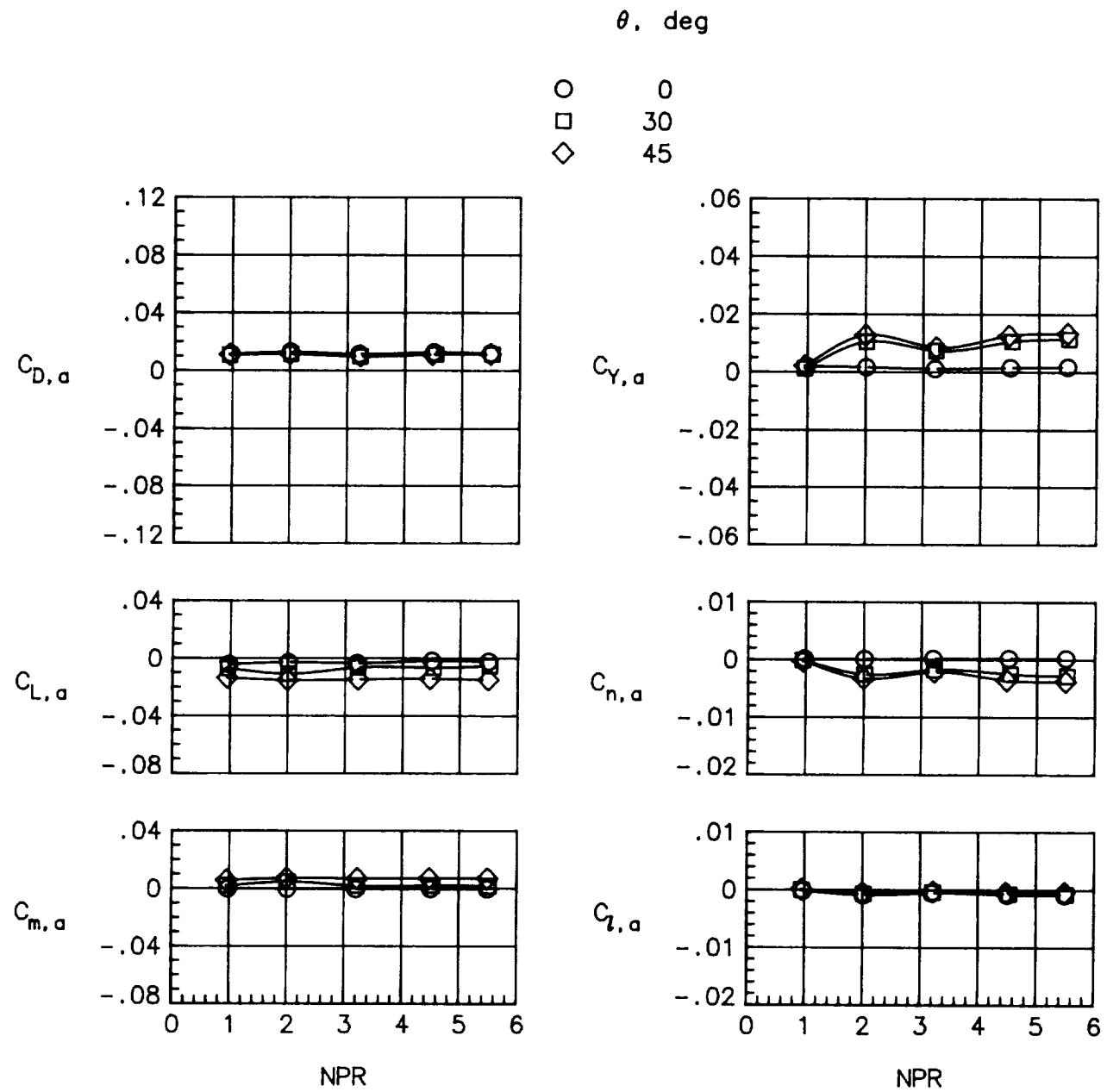
(a) $M = 0.20$.

Figure 37. Effect of nozzle cant angle on thrust-removed longitudinal aerodynamic characteristics for standard flaps with $\delta_{v,p,l} = -20^\circ$, $\delta_{v,p,r} = 20^\circ$, and $\alpha = 0^\circ$.



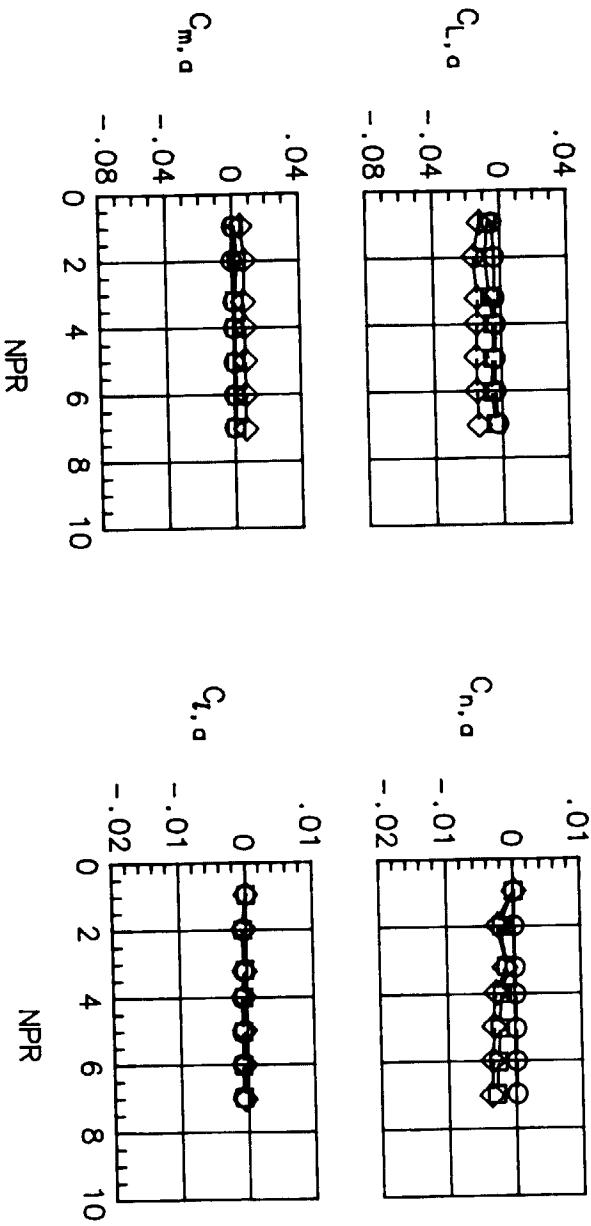
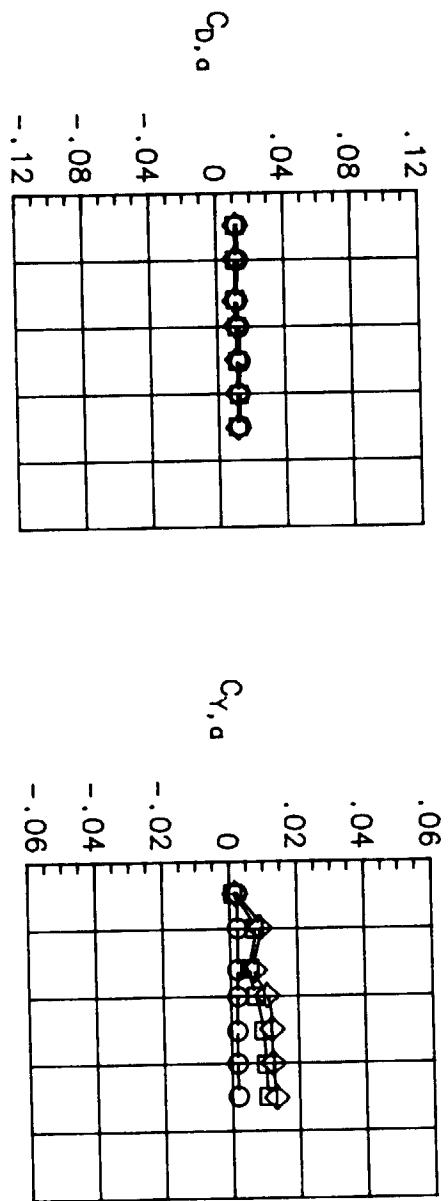
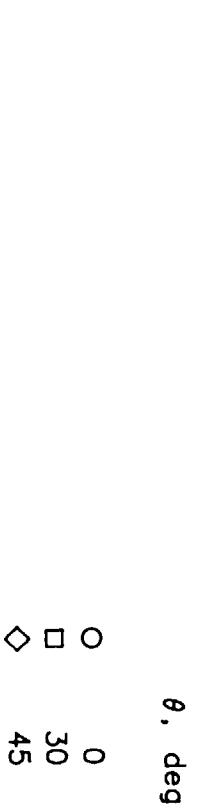
(b) $M = 0.60$.

Figure 37. Continued.



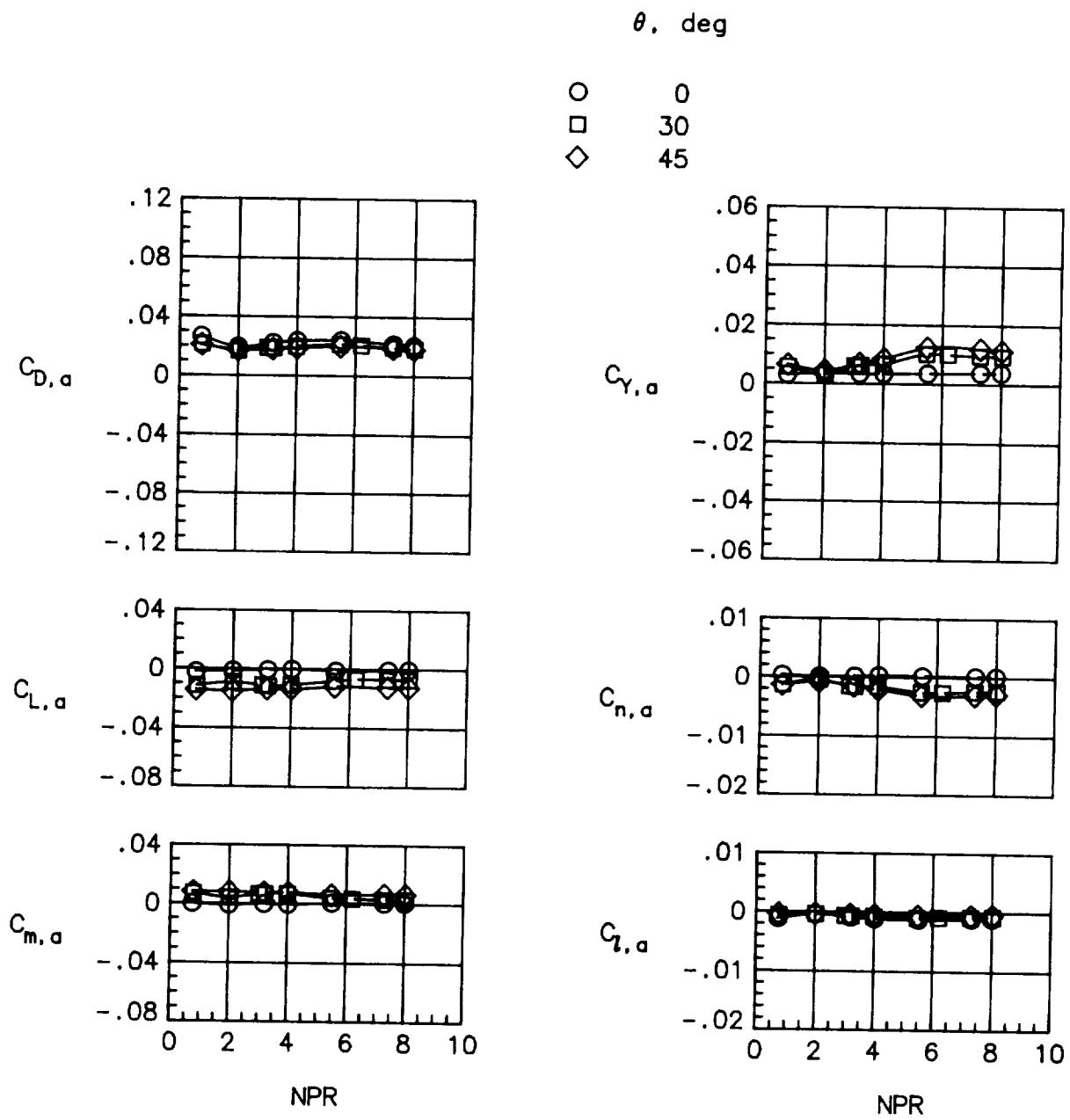
(c) $M = 0.80$.

Figure 37. Continued.



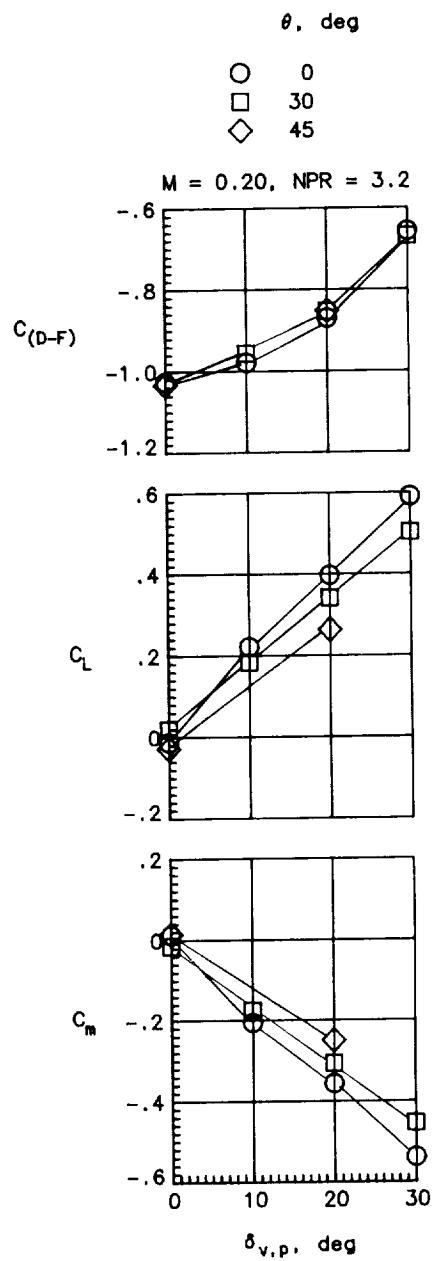
(d) $M = 0.90$.

Figure 37. Continued.



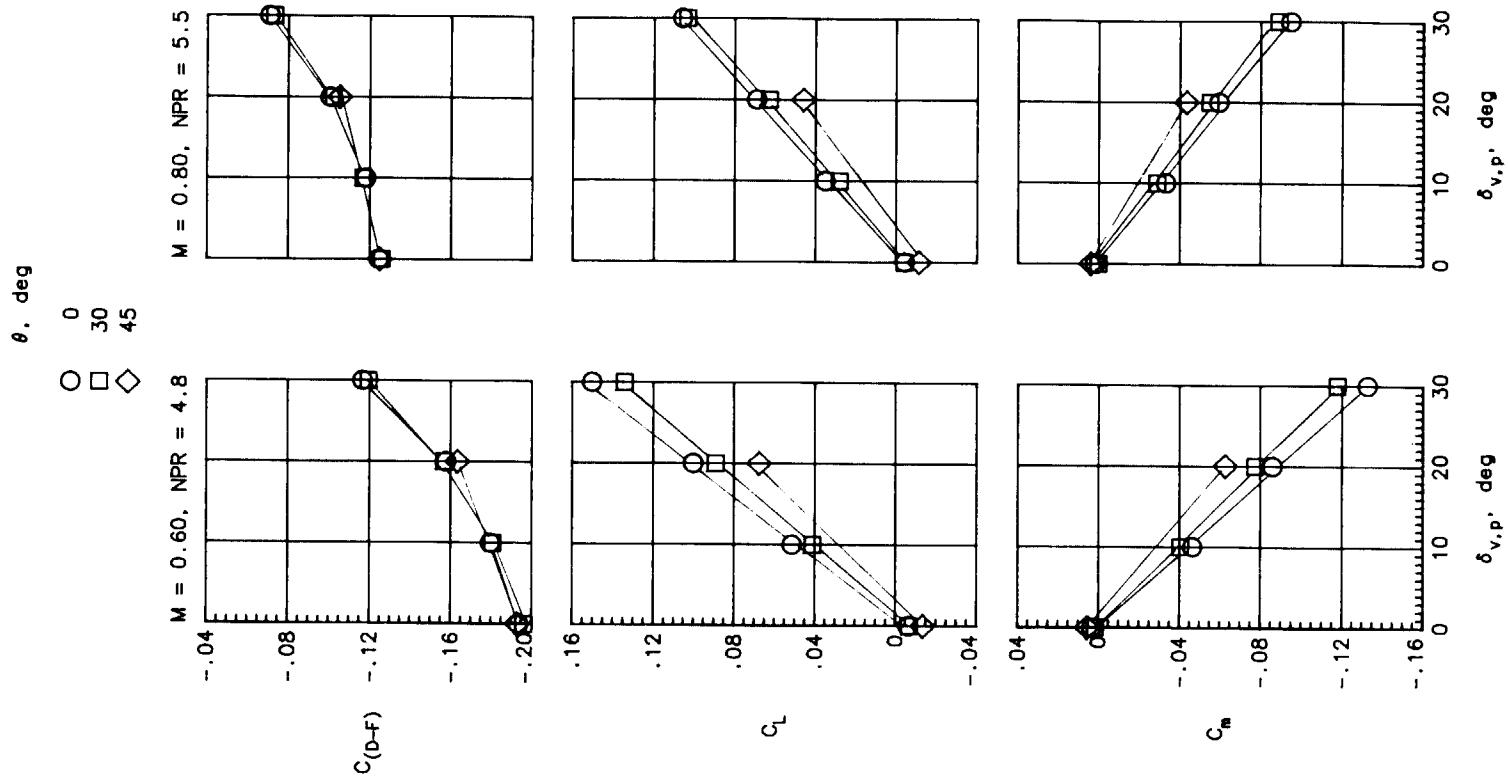
(e) $M = 1.20$.

Figure 37. Concluded.



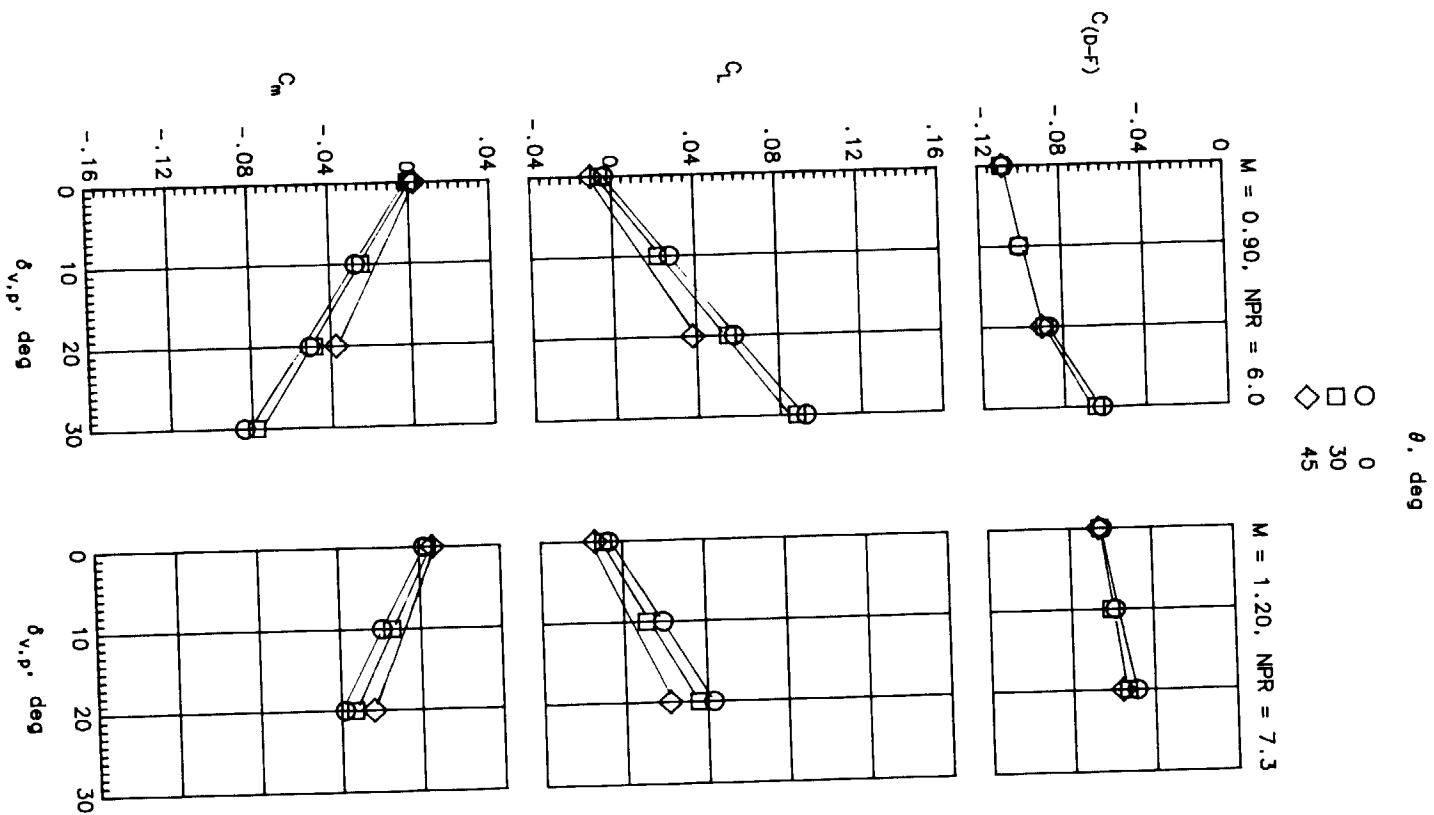
(a) $M = 0.20$.

Figure 38. Summary of total longitudinal aerodynamic characteristics for standard flaps with $\alpha = 0^\circ$.



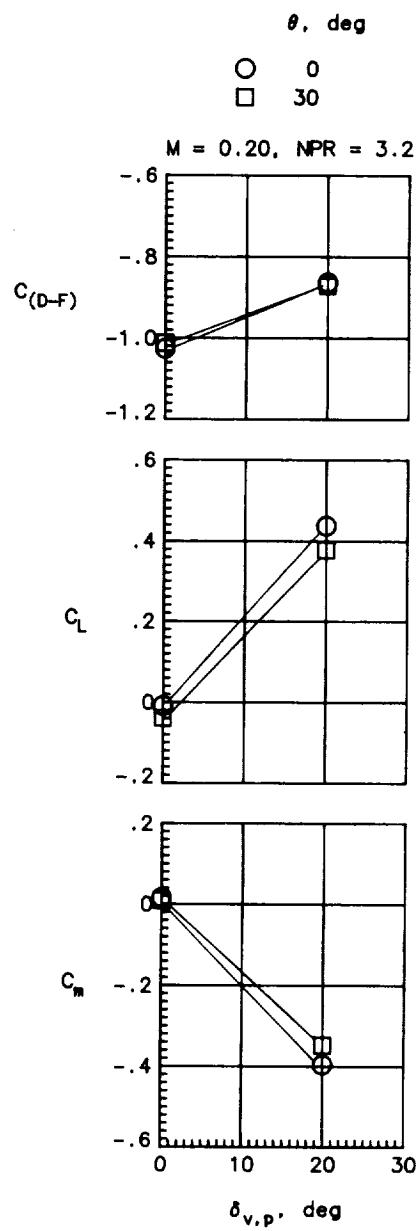
(b) $M = 0.60$ and 0.80 .

Figure 38. Continued.



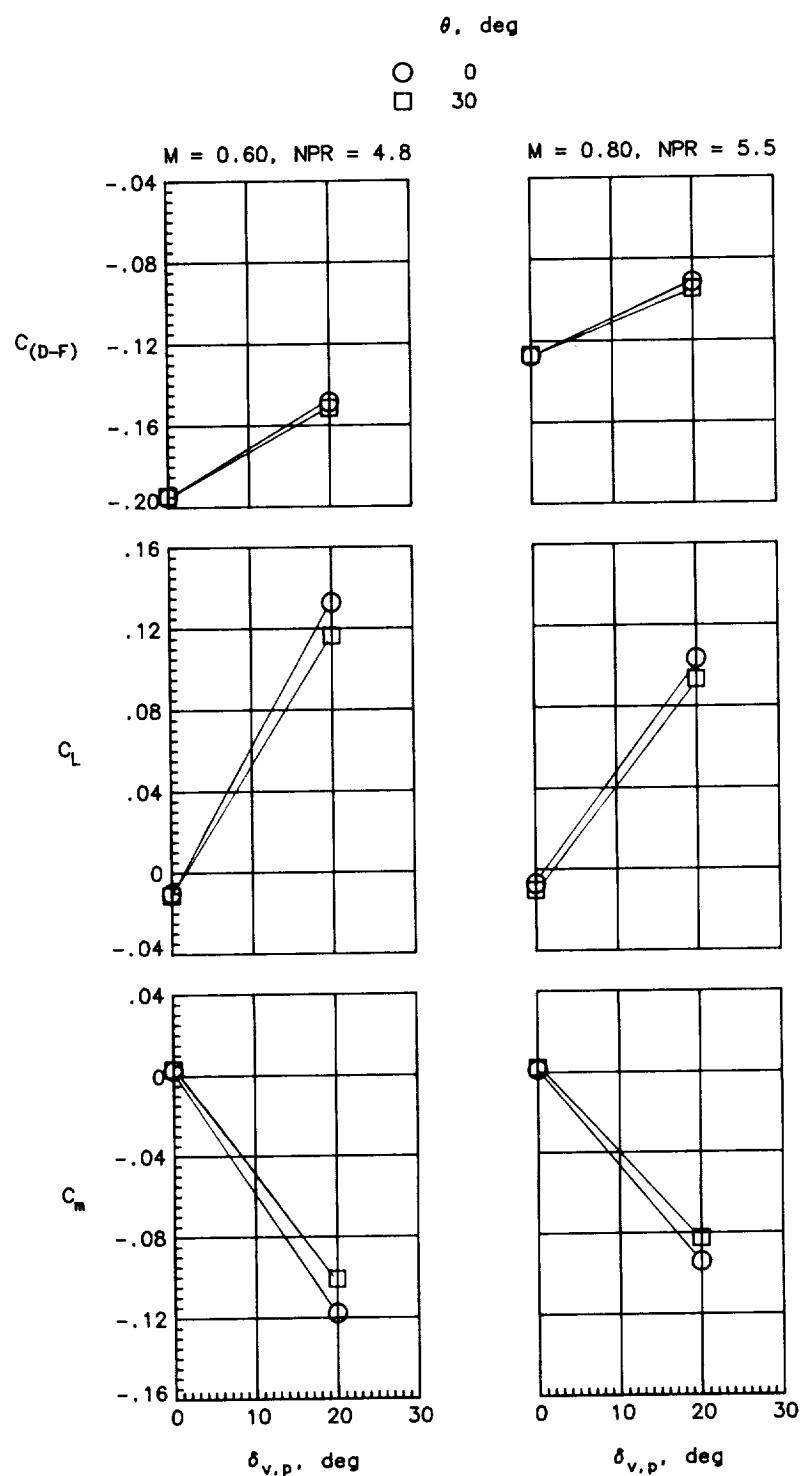
(c) $M = 0.90$ and 1.20 .

Figure 38. Concluded.



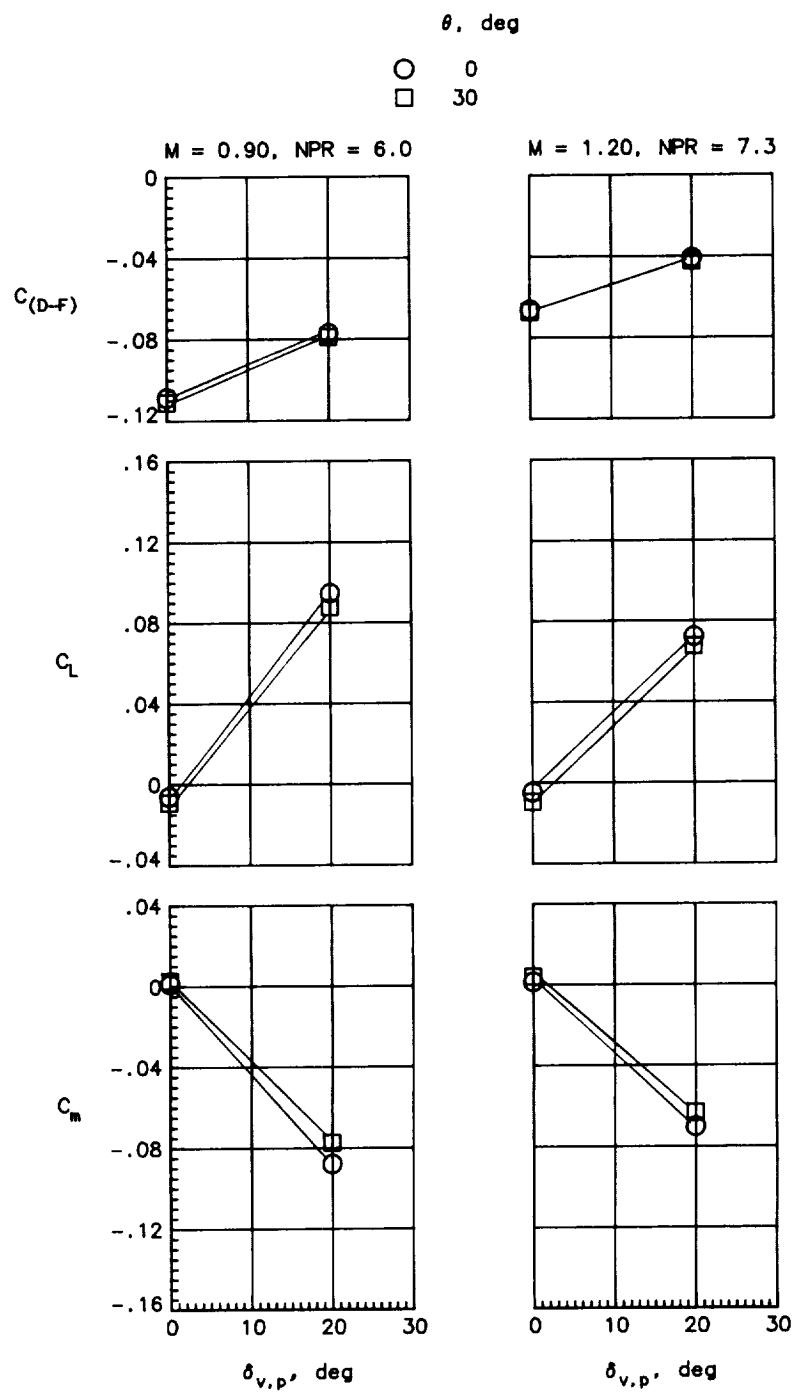
(a) $M = 0.20$.

Figure 39. Summary of total longitudinal aerodynamic characteristics for long flaps with $\alpha = 0^\circ$.



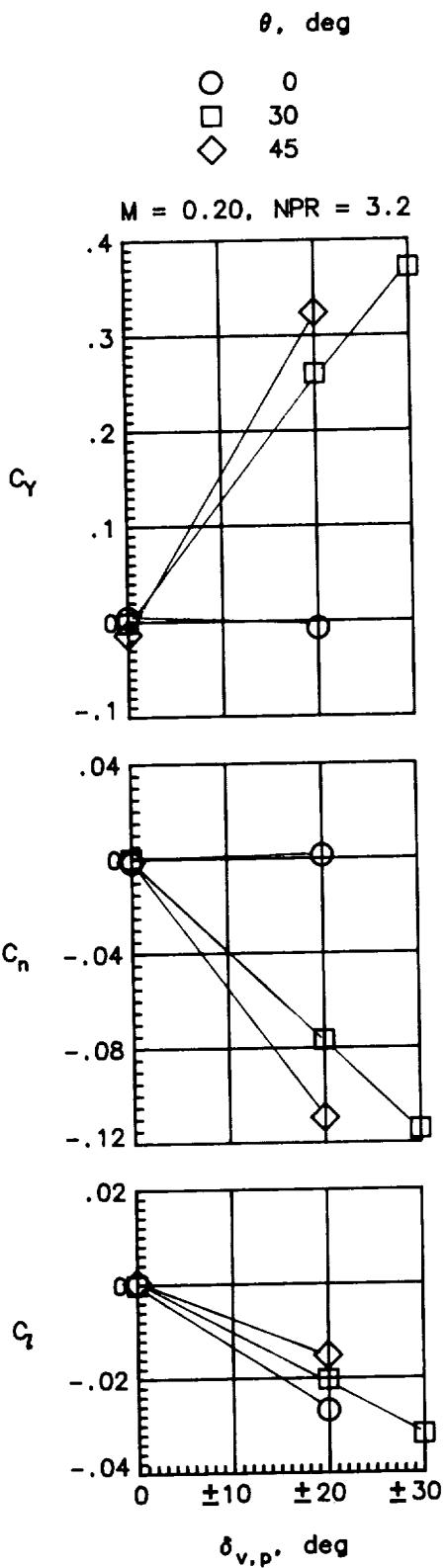
(b) $M = 0.60$ and 0.80 .

Figure 39. Continued.



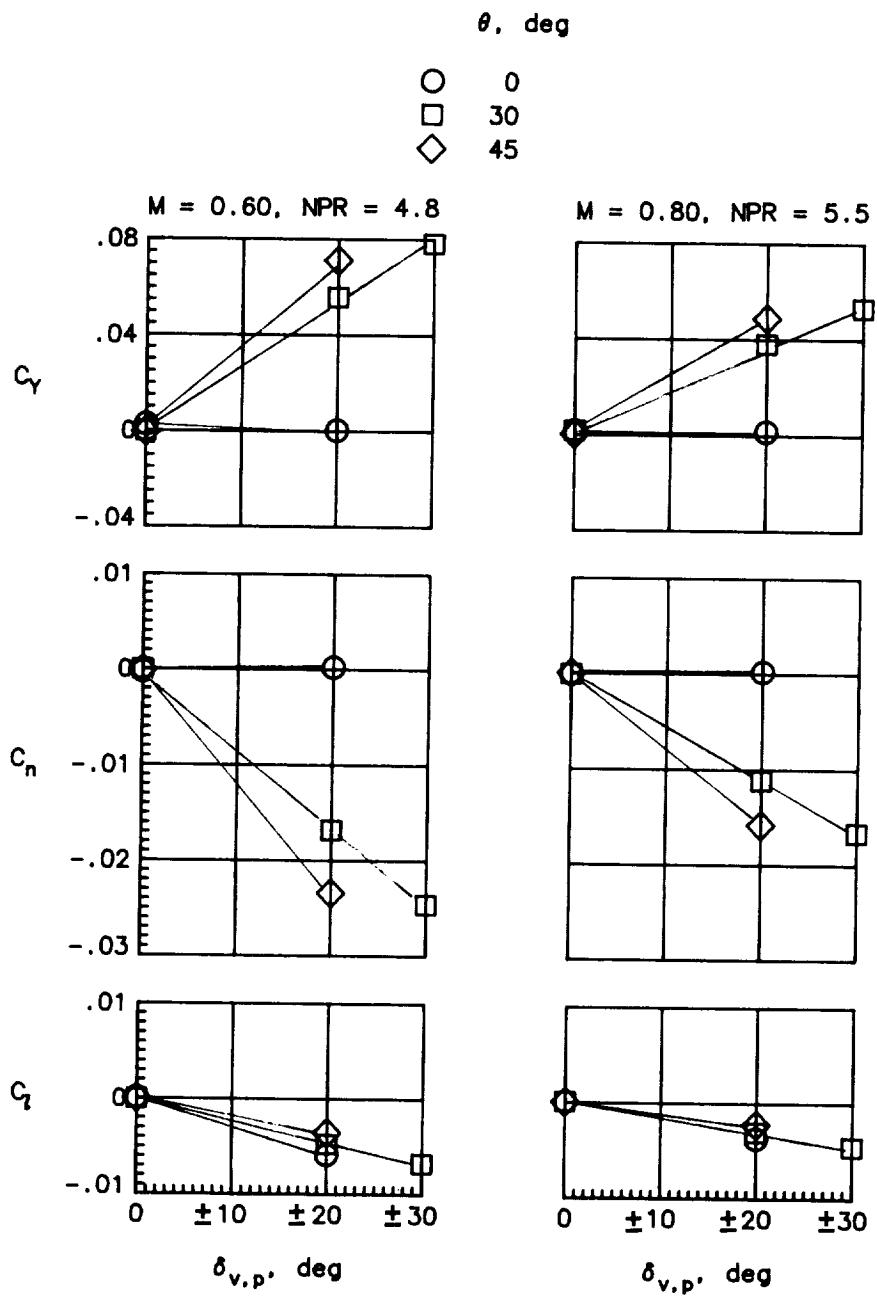
(c) $M = 0.90$ and 1.20 .

Figure 39. Concluded.



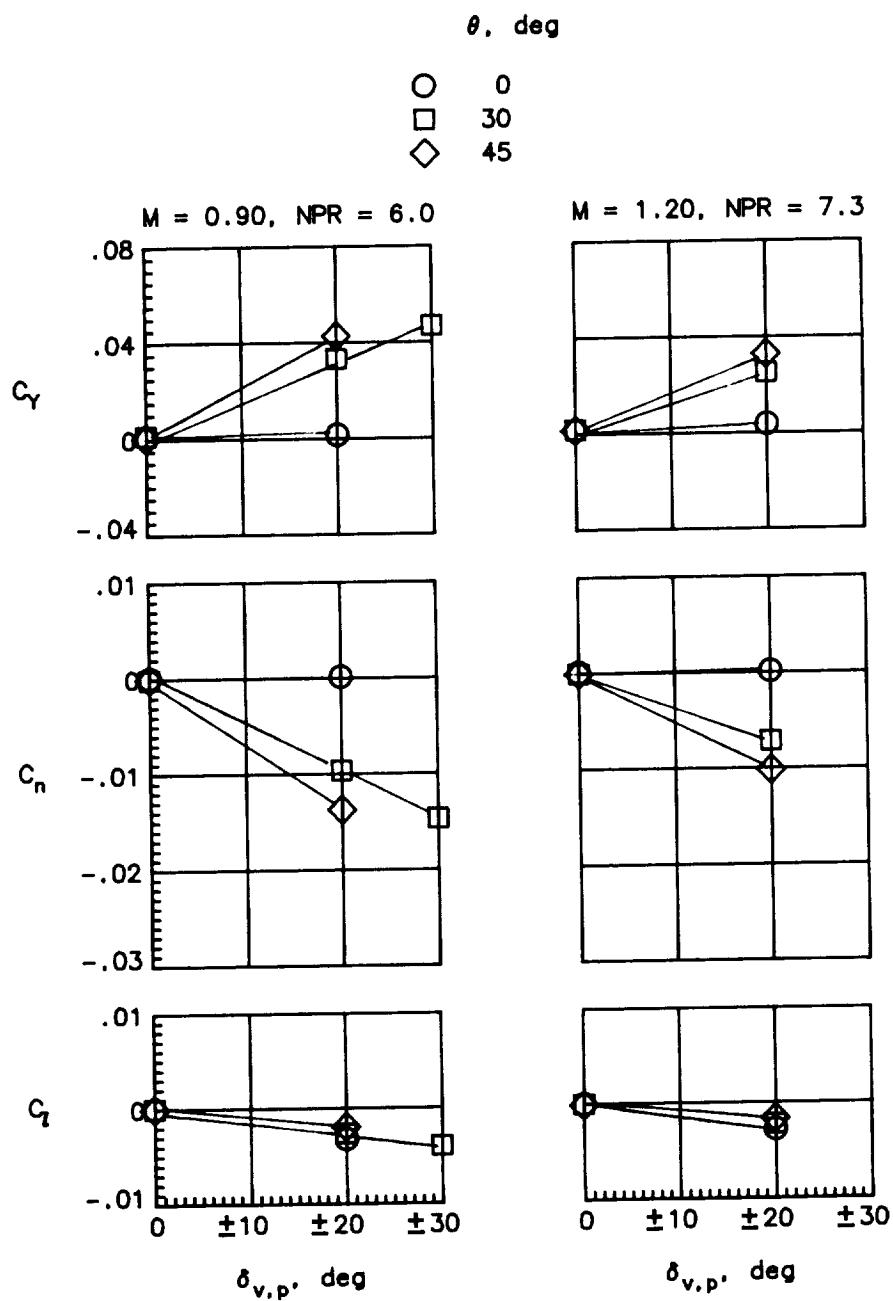
(a) $M = 0.20$.

Figure 40. Summary of total lateral aerodynamic characteristics for standard flaps with $\alpha = 0^\circ$.



(b) $M = 0.60$ and 0.80 .

Figure 40. Continued.



(c) $M = 0.90$ and 1.20 .

Figure 40. Concluded.

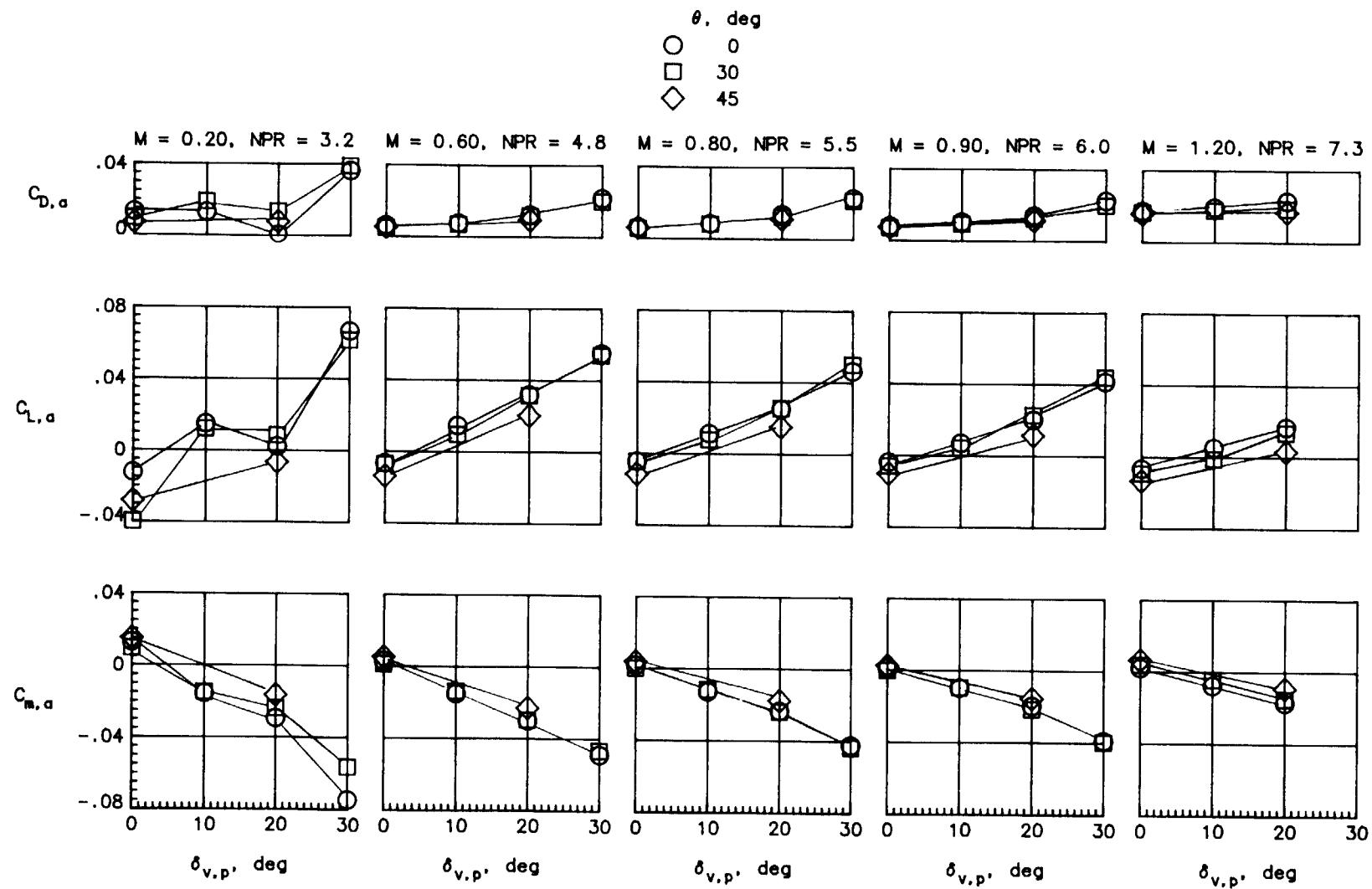


Figure 41. Summary of induced longitudinal aerodynamic characteristics for standard flaps with $\alpha = 0^\circ$.

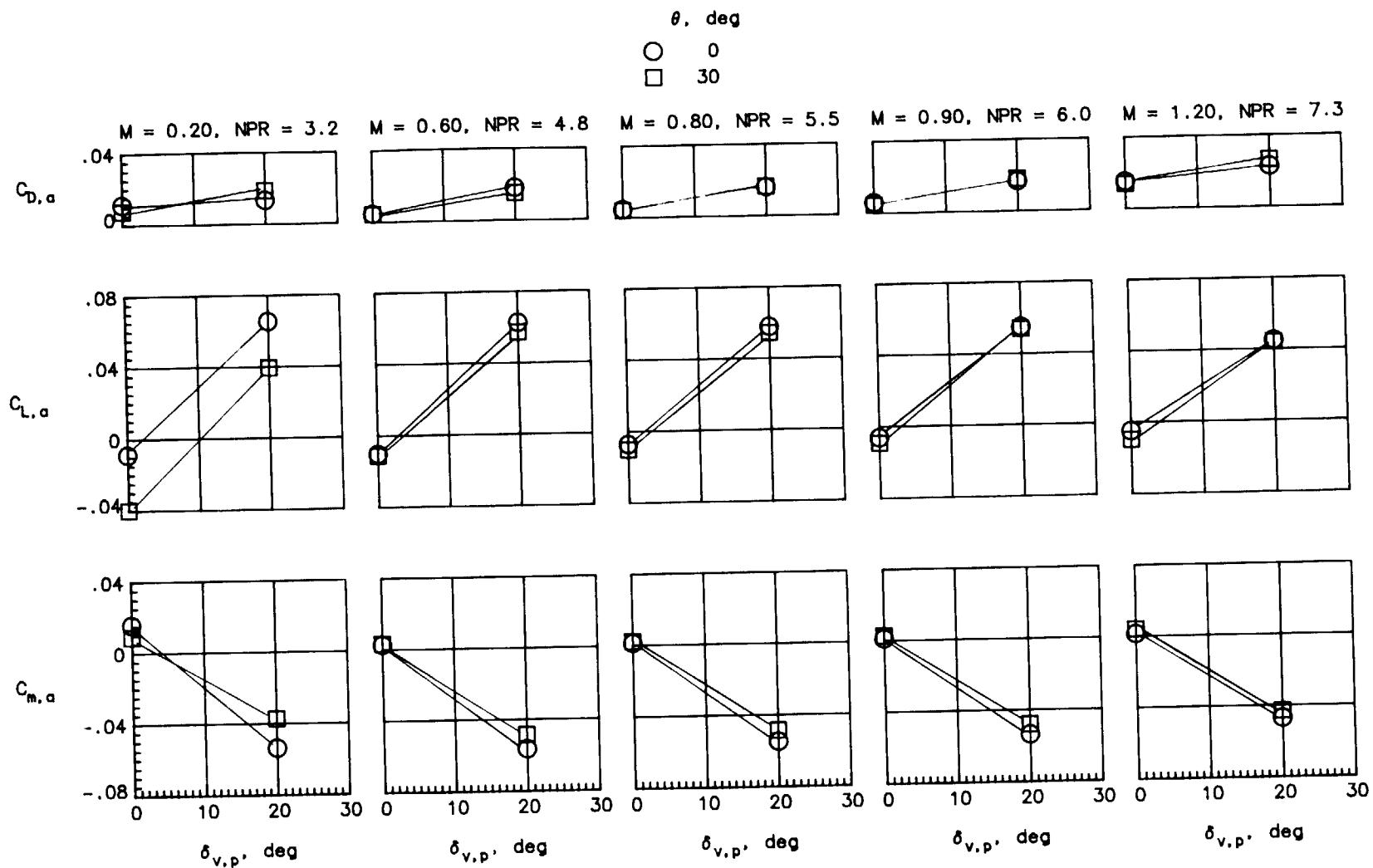


Figure 42. Summary of induced longitudinal aerodynamic characteristics for long flaps with $\alpha = 0^\circ$.

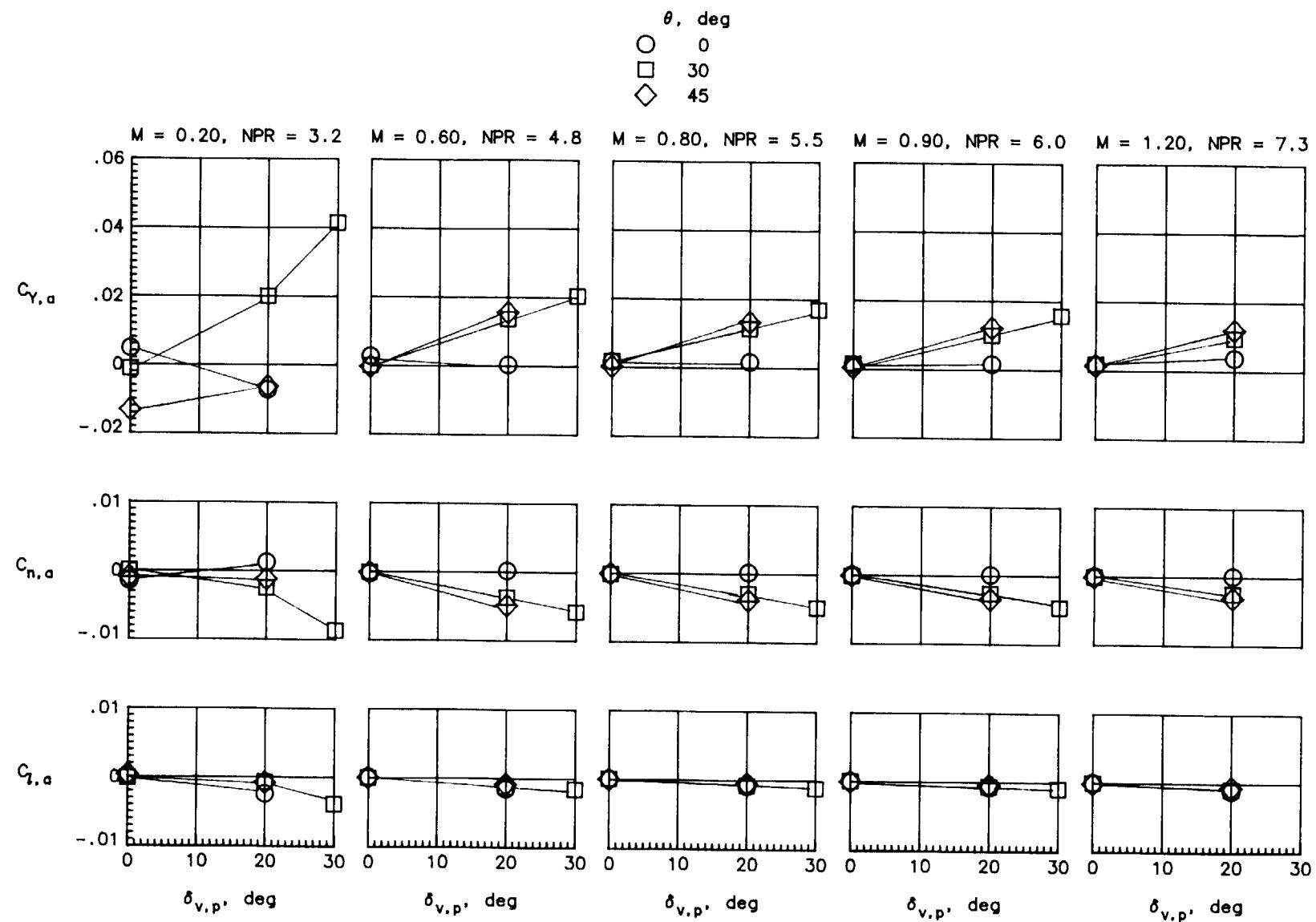


Figure 43. Summary of induced lateral aerodynamic characteristics for standard flaps with $\alpha = 0^\circ$.

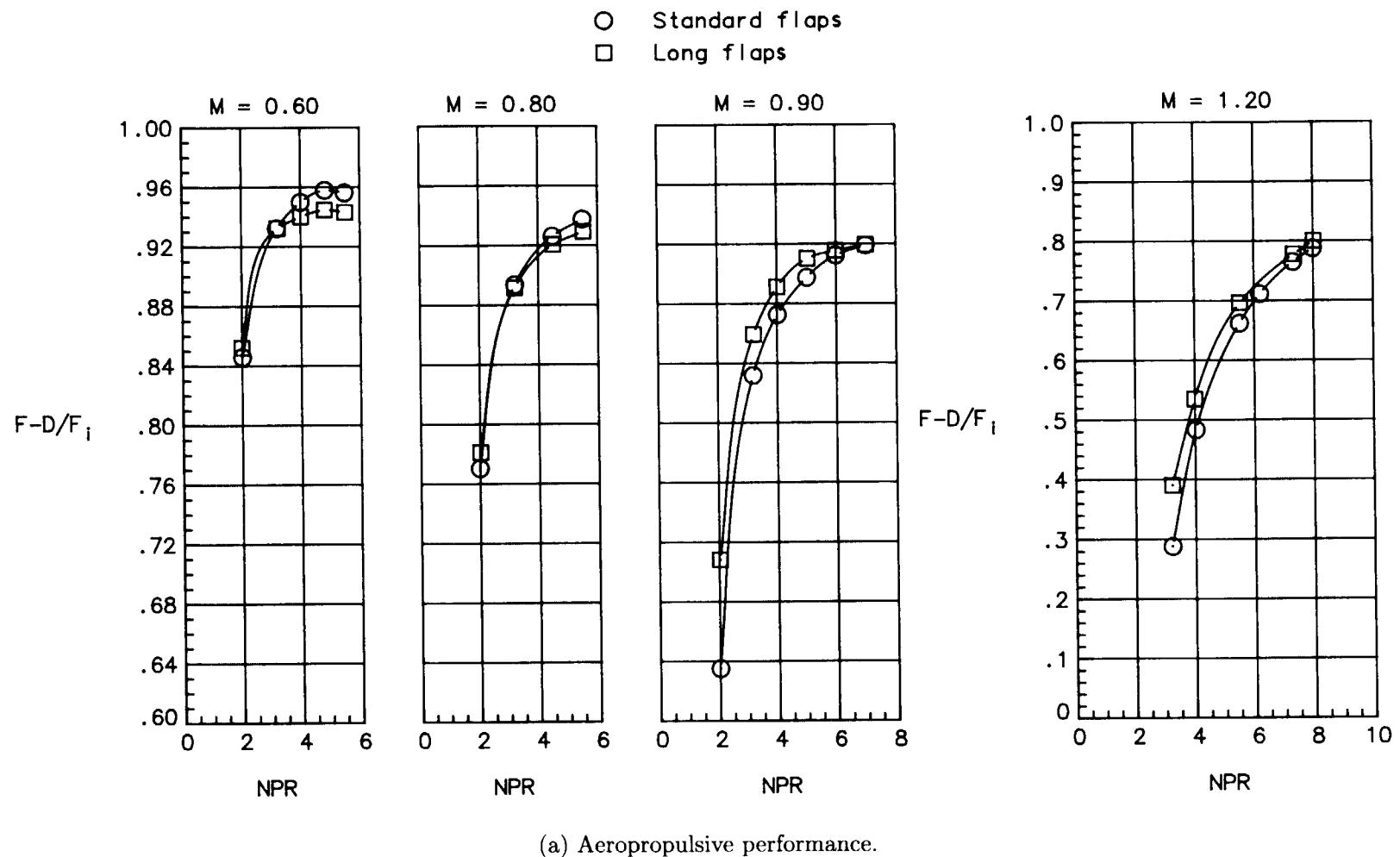
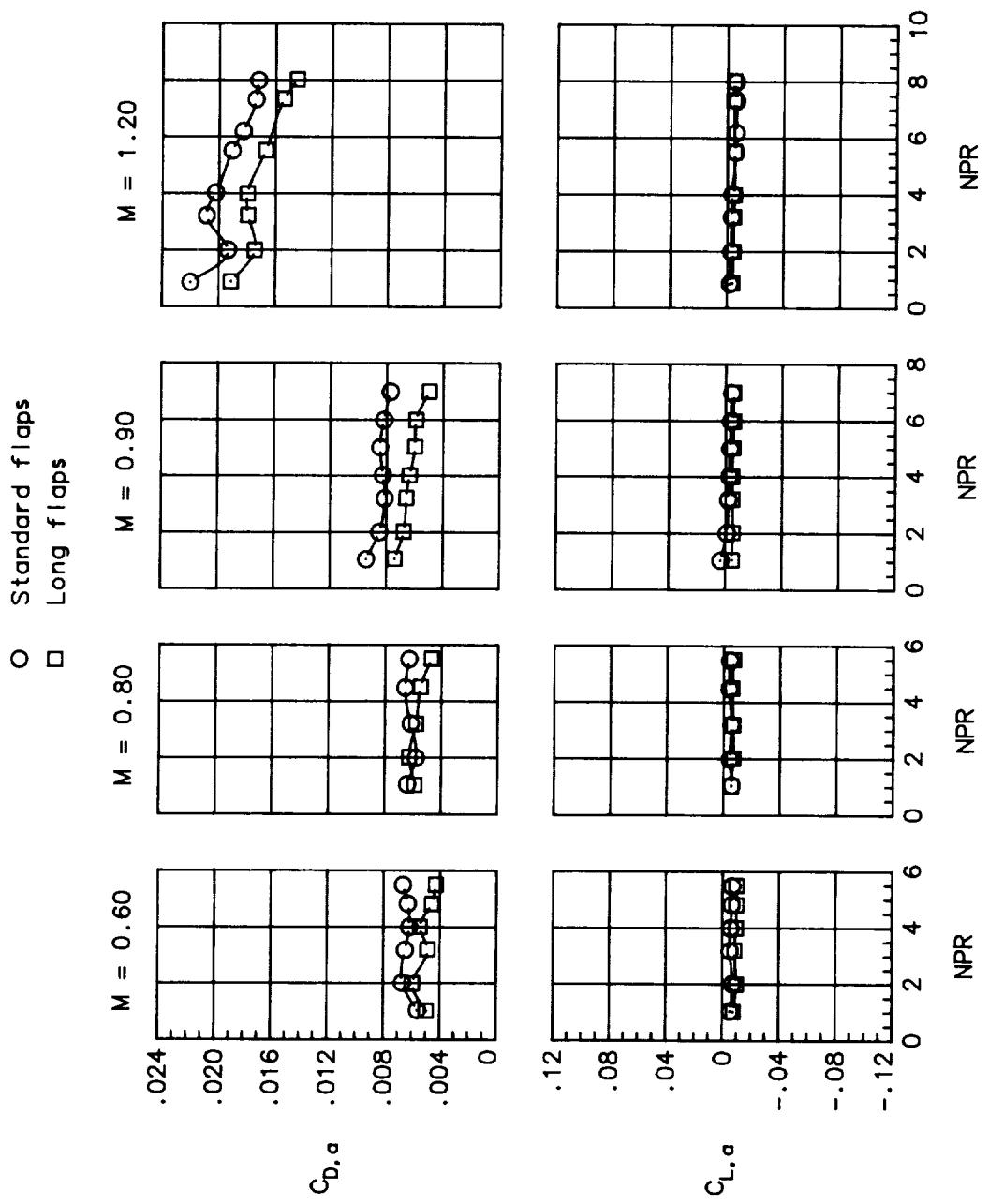
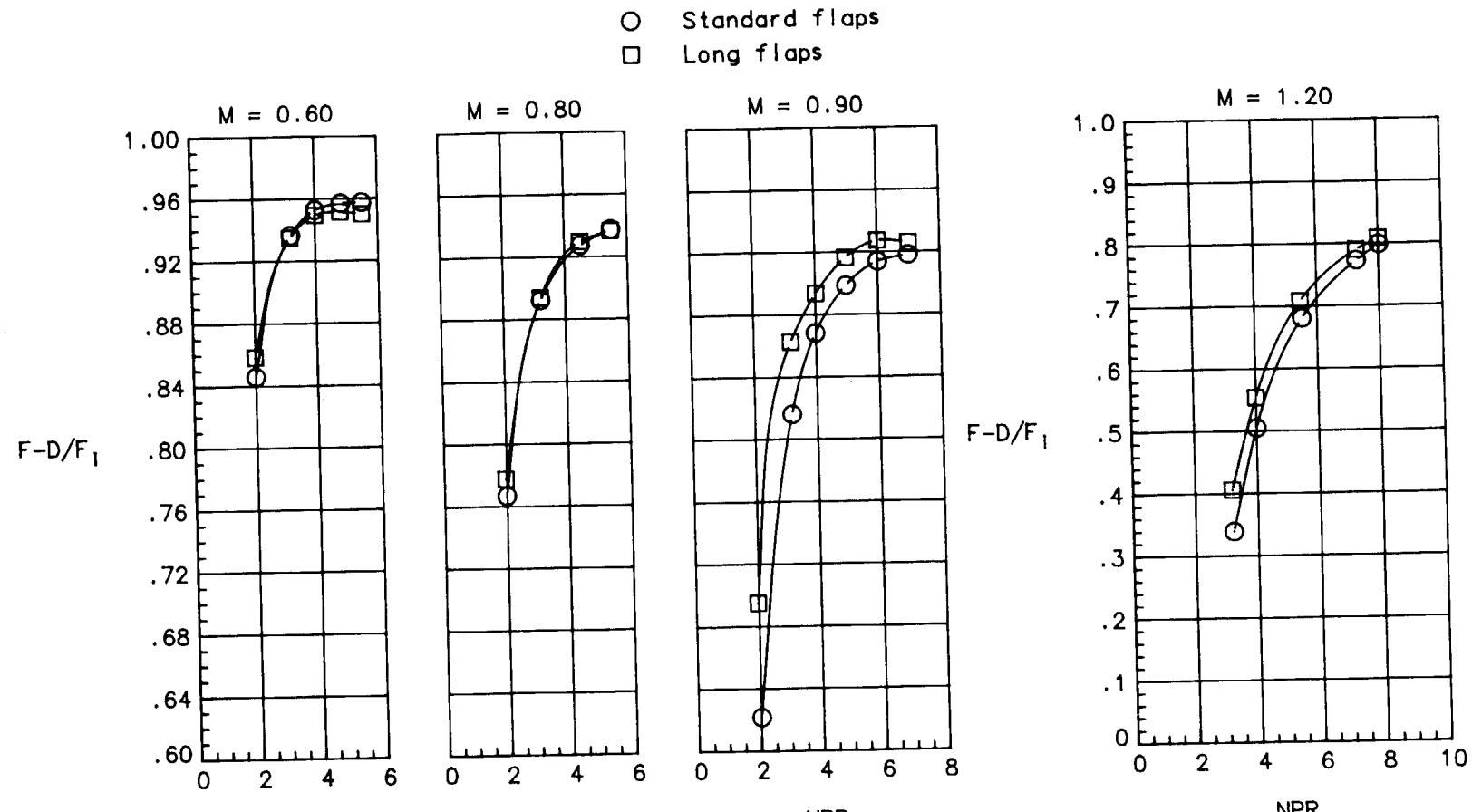


Figure 44. Effect of nozzle flap length on afterbody performance with $\theta = 0^\circ$, $\delta_{v,p,l} = 0^\circ$, $\delta_{v,p,r} = 0^\circ$, and $\alpha = 0^\circ$.

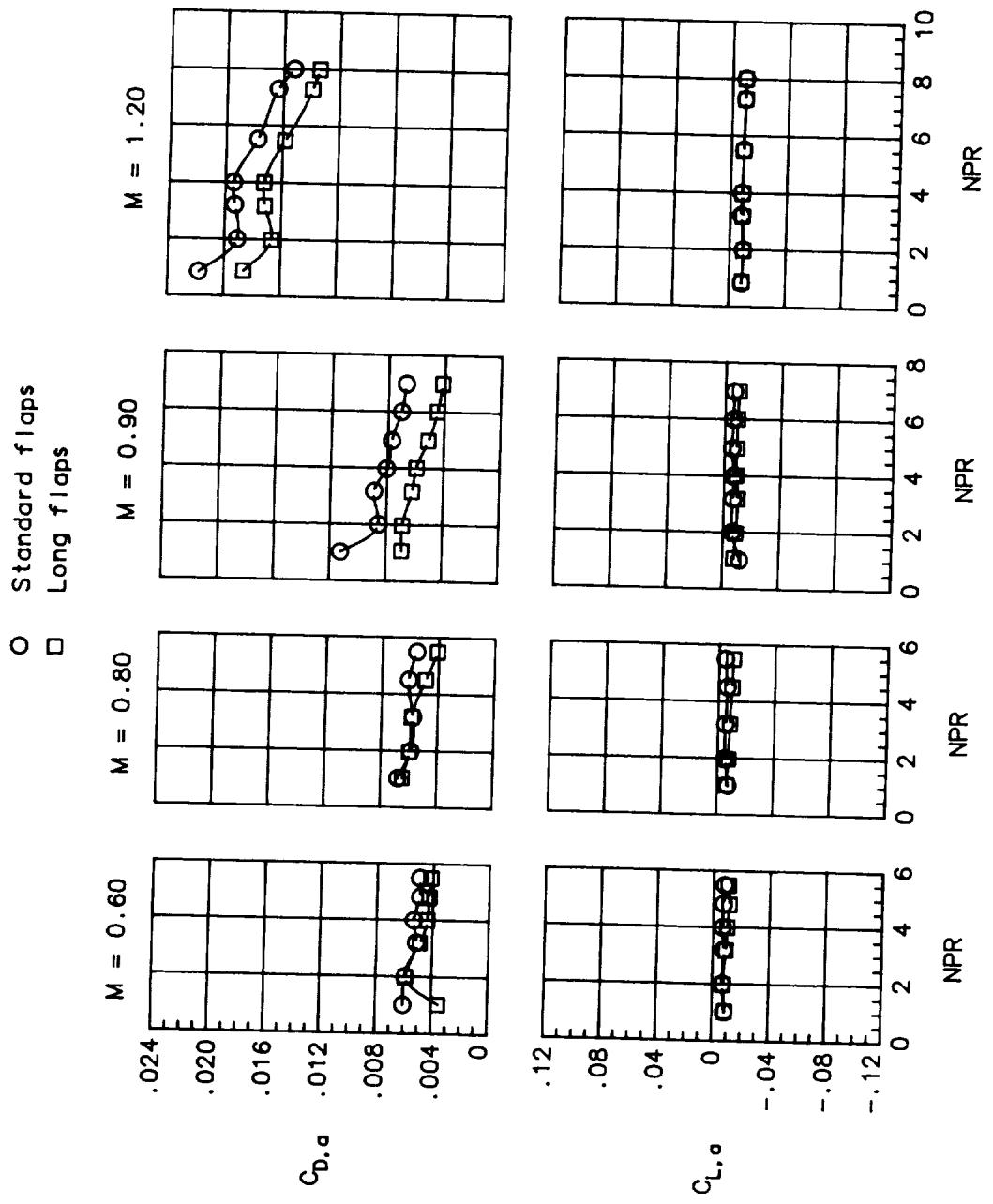


(b) Afterbody lift and drag characteristics.
Figure 44. Concluded.



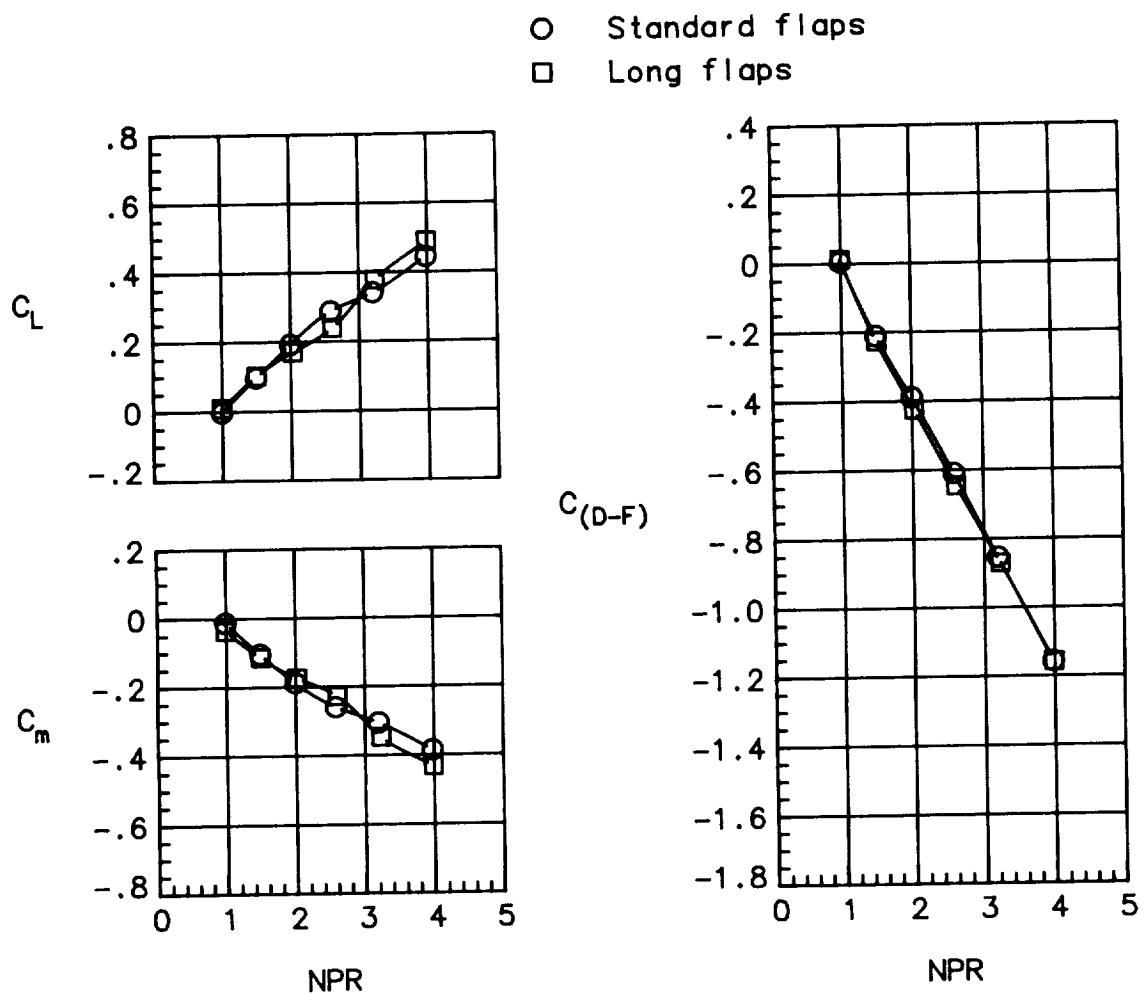
(a) Aeropropulsive performance.

Figure 45. Effect of nozzle flap length on afterbody performance with $\theta = 30^\circ$, $\delta_{v,p,l} = 0^\circ$, $\delta_{v,p,r} = 0^\circ$, and $\alpha = 0^\circ$.



(b) Afterbody lift and drag characteristics.

Figure 45. Concluded.



(a) $M = 0.20$.

Figure 46. Effect of nozzle flap length on total longitudinal aerodynamic characteristics with $\theta = 30^\circ$, $\delta_{v,p,l} = 20^\circ$, $\delta_{v,p,r} = 20^\circ$, and $\alpha = 0^\circ$.

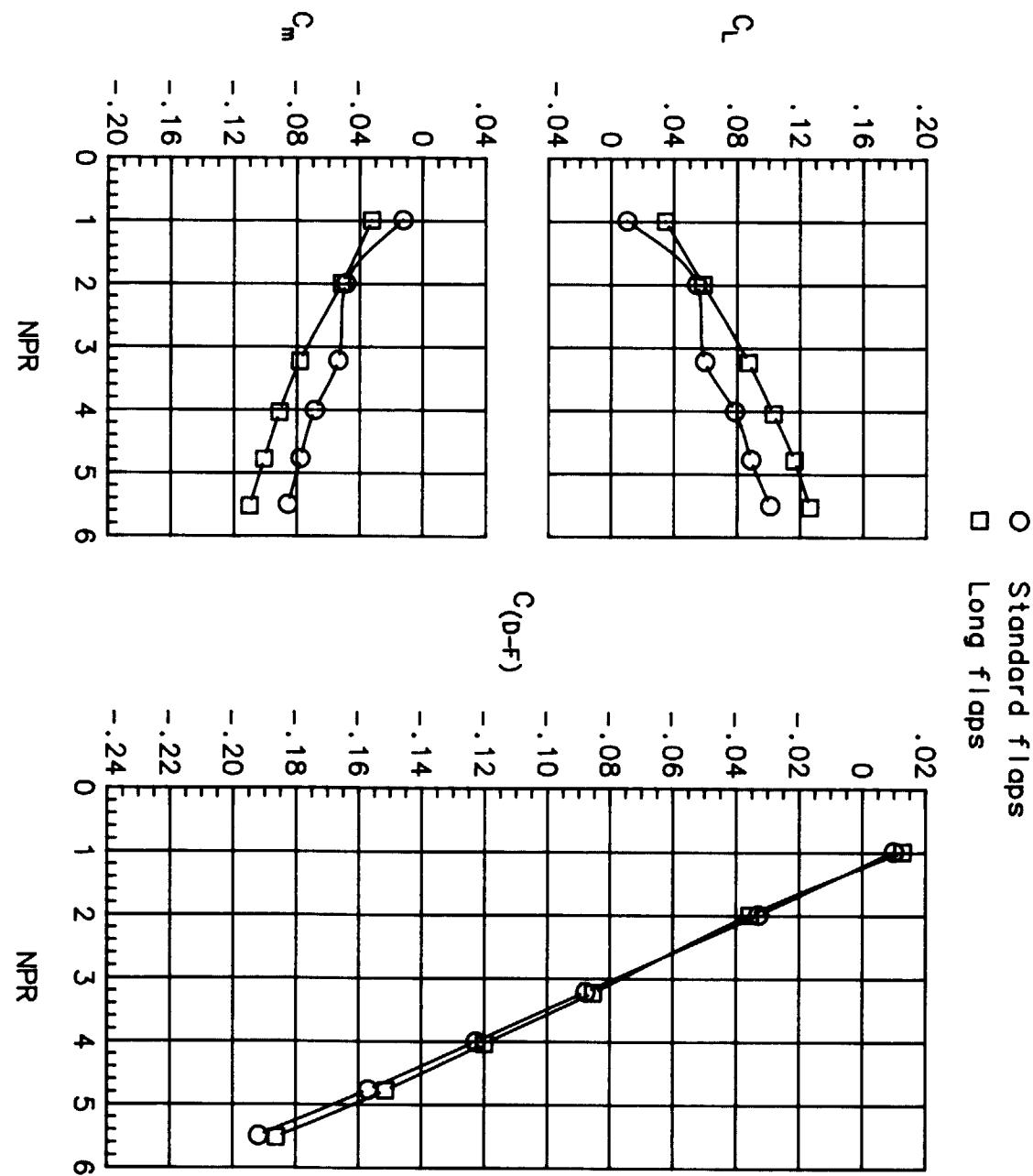
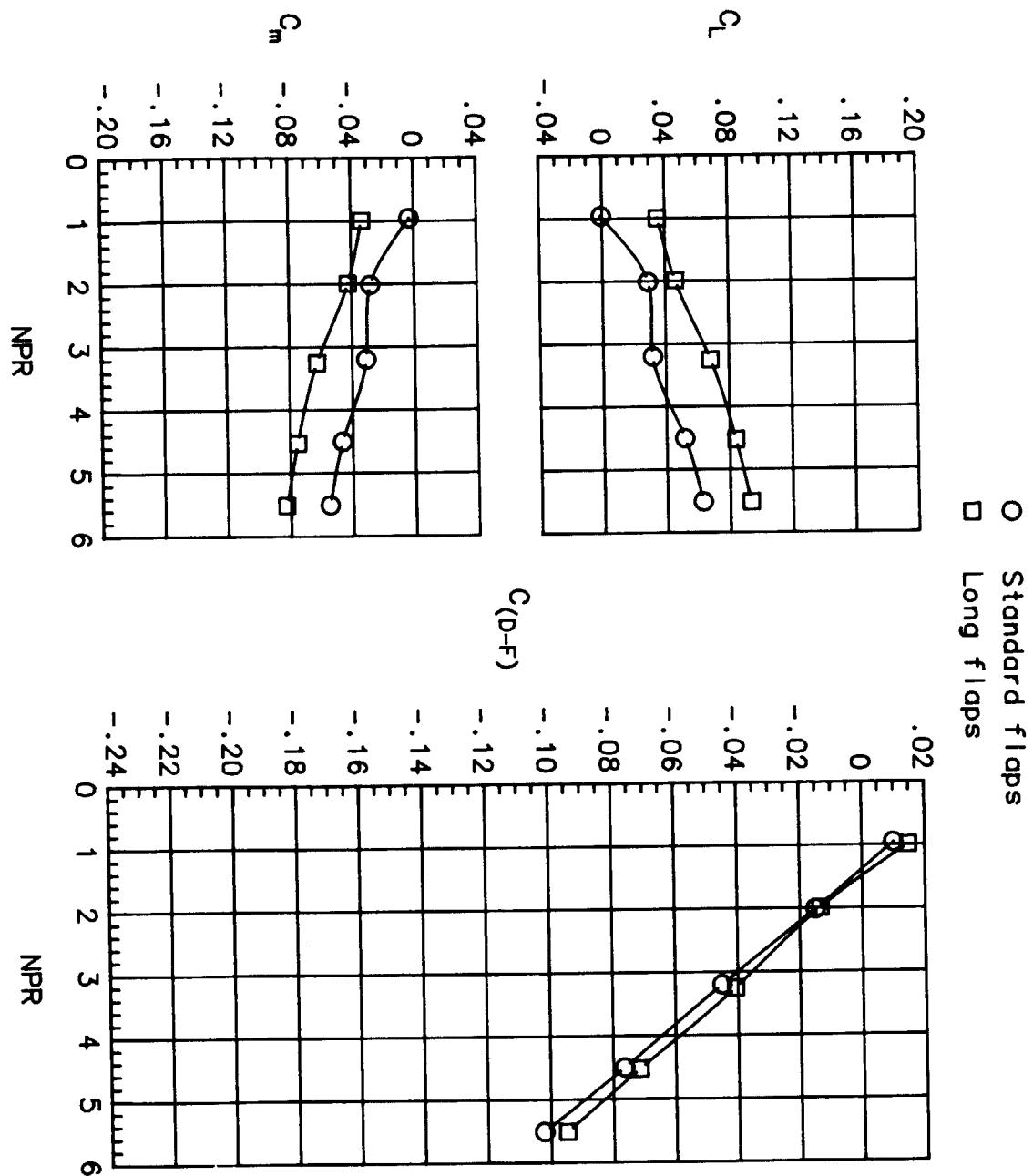
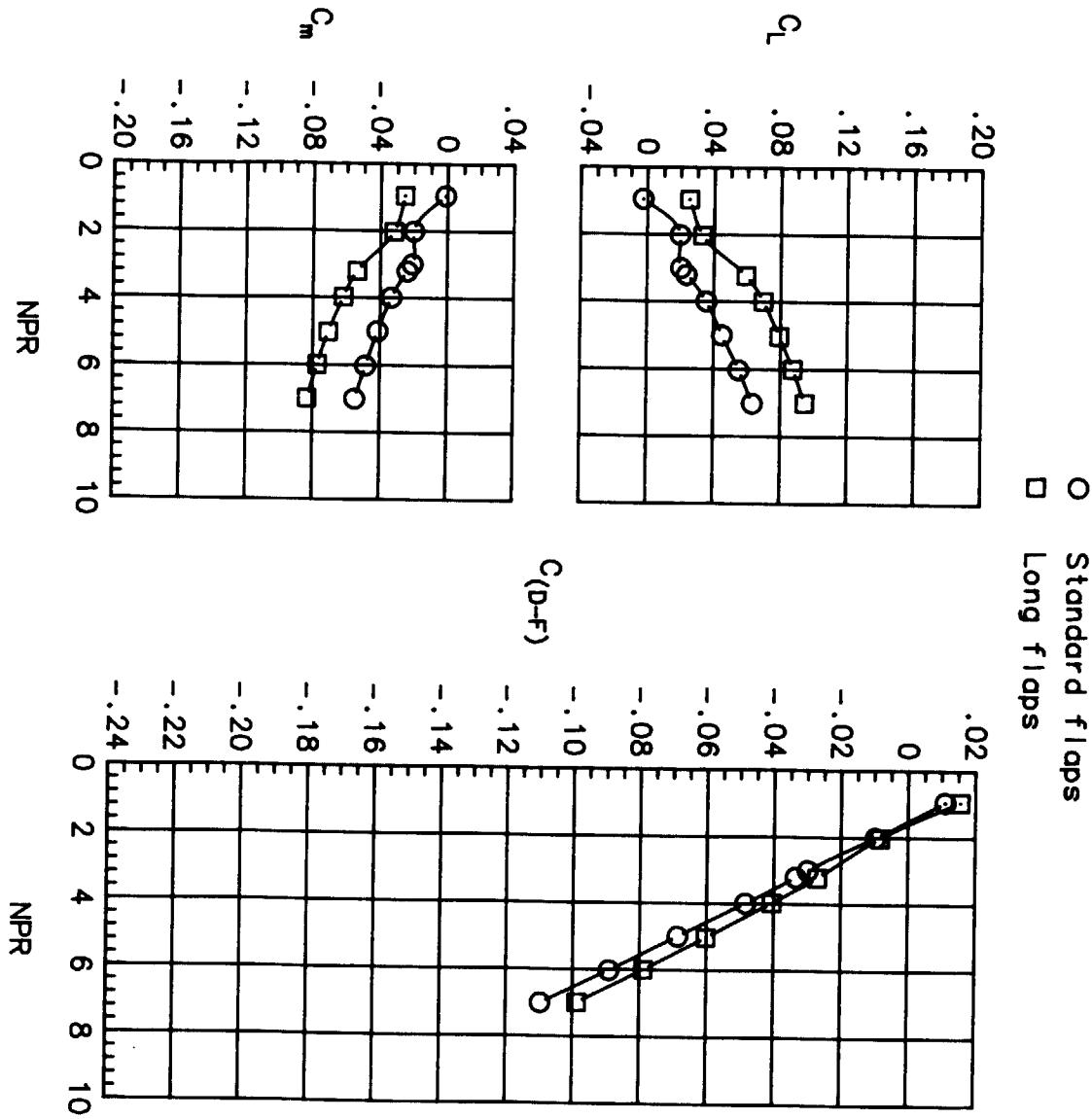
(b) $M = 0.60$.

Figure 46. Continued.

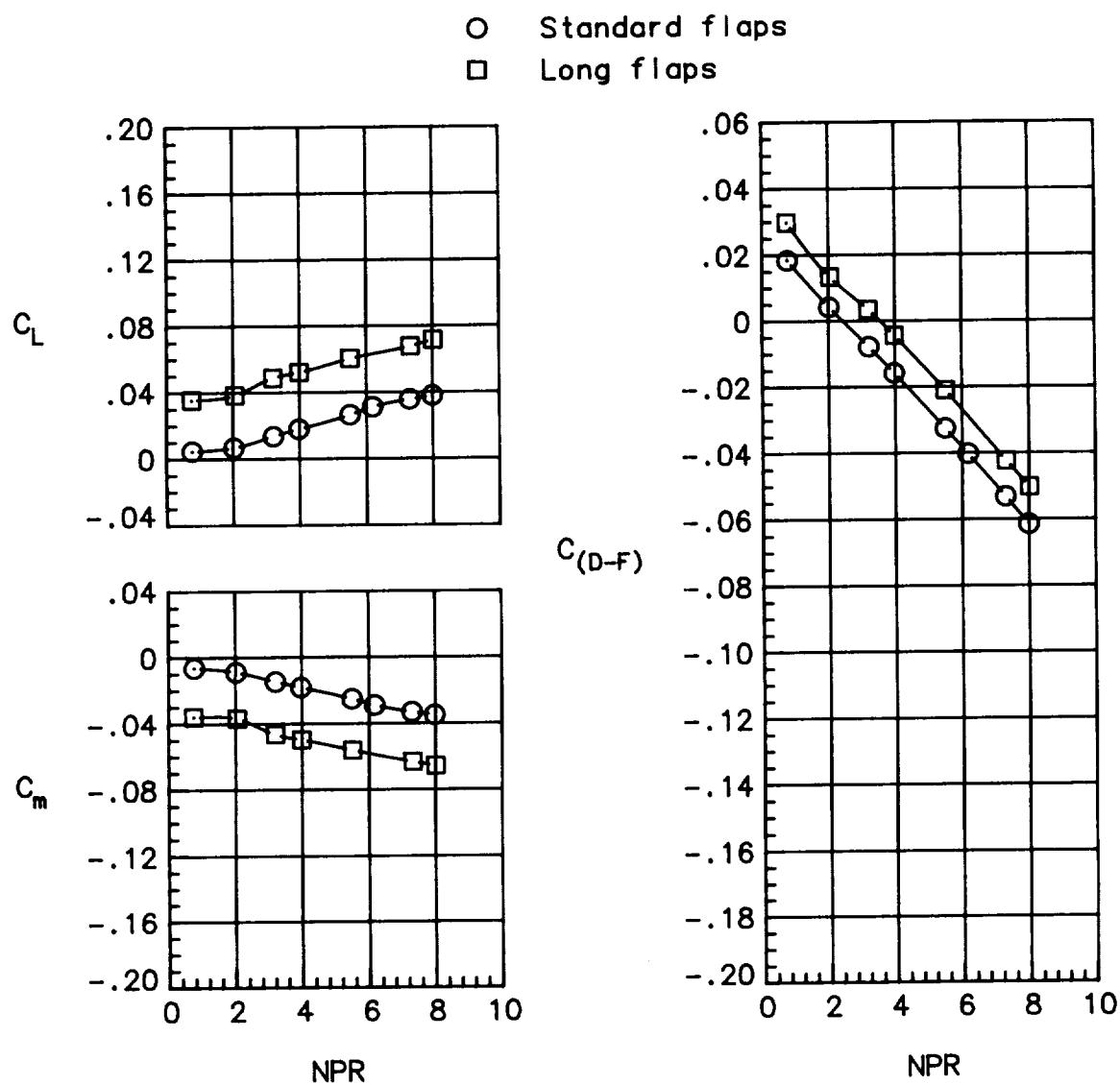


(c) $M = 0.80$.

Figure 46. Continued.



(d) $M = 0.90$.
Figure 46. Continued.



(e) $M = 1.20$.

Figure 46. Concluded.

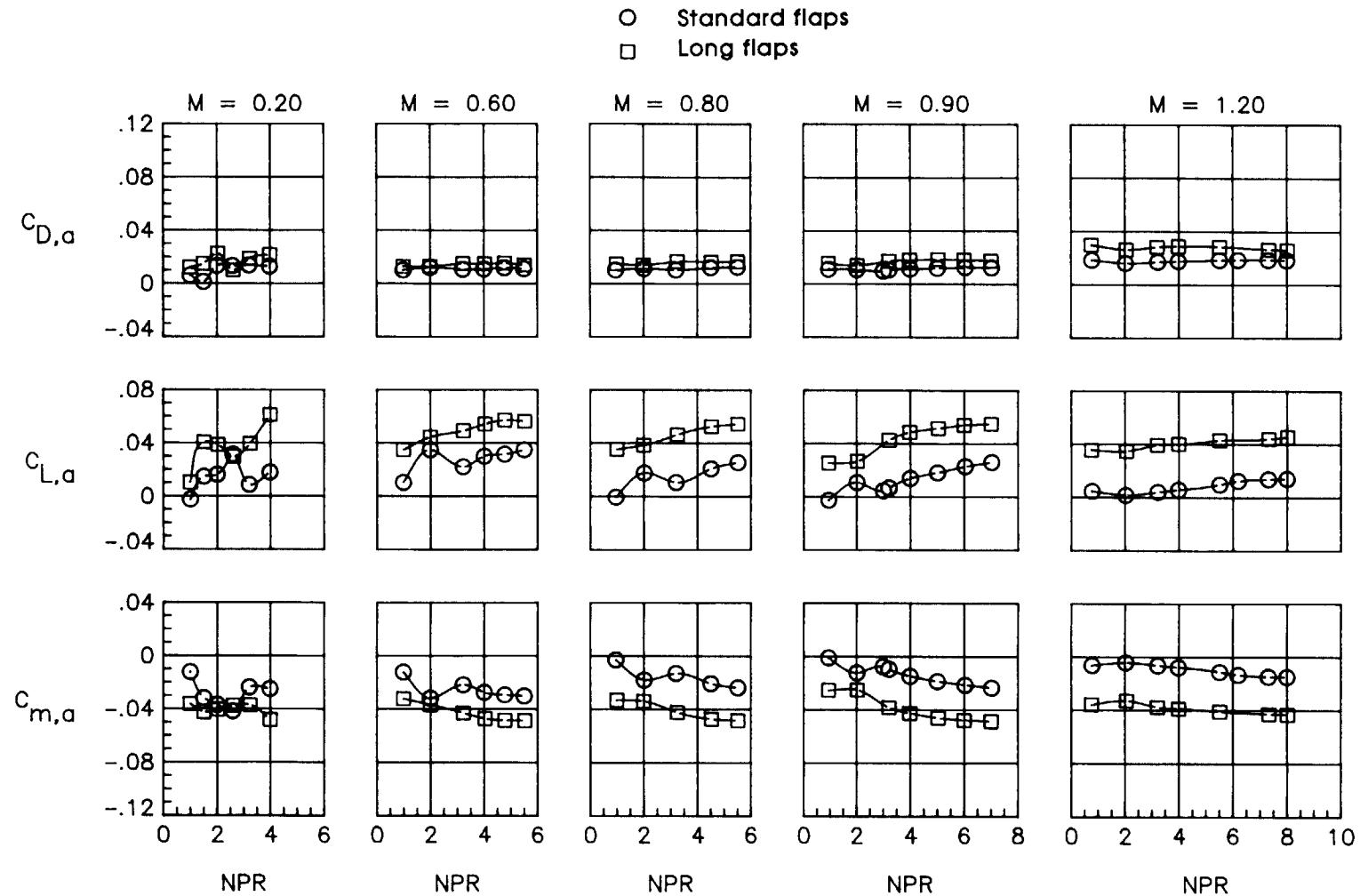


Figure 47. Effect of flap length on thrust-removed longitudinal aerodynamic characteristics with $\theta = 30^\circ$, $\delta_{v,p,l} = 20^\circ$, $\delta_{v,p,r} = 20^\circ$, and $\alpha = 0^\circ$.

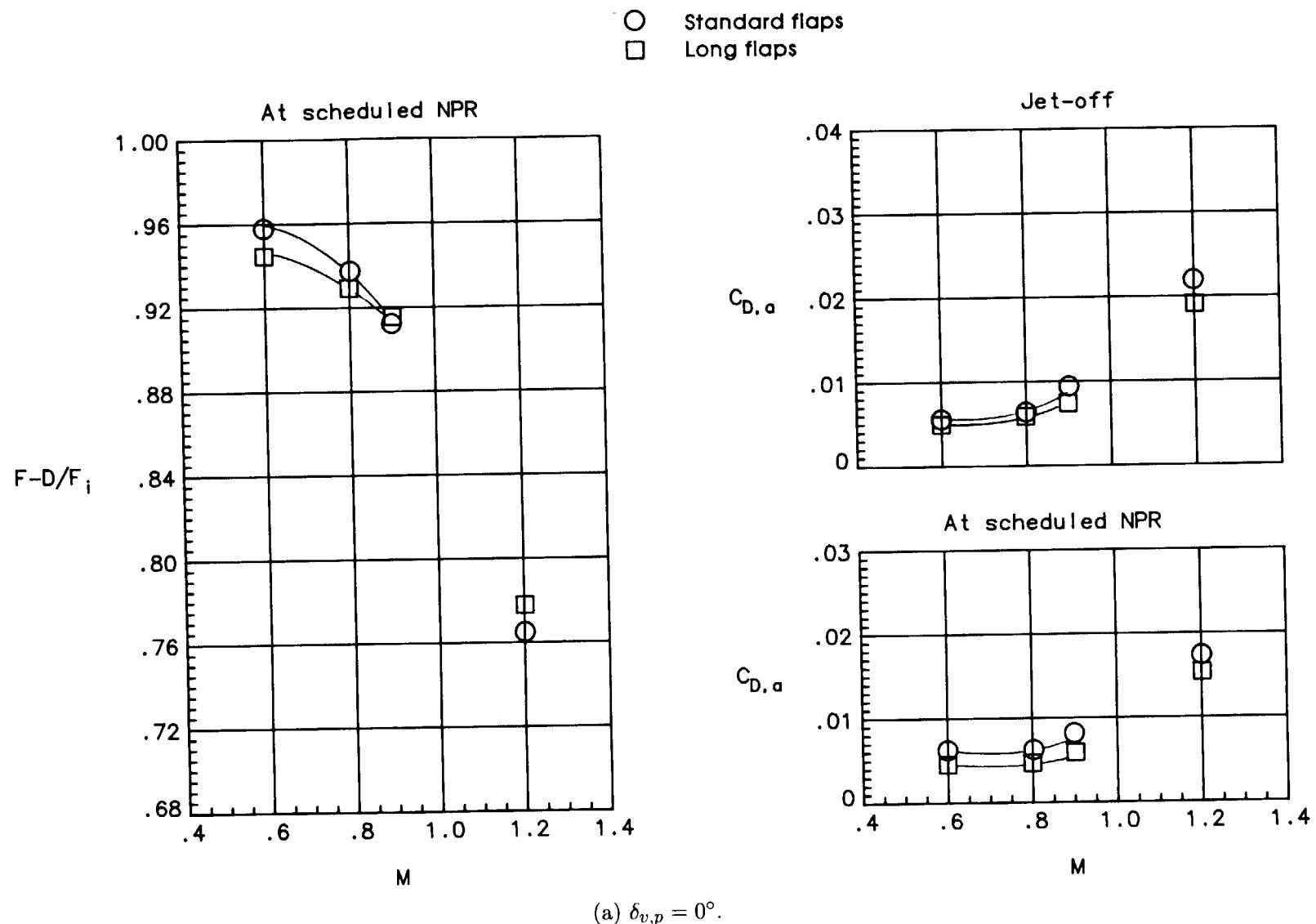


Figure 48. Summary of afterbody aeropropulsive performance with $\theta = 0^\circ$ and $\alpha = 0^\circ$.

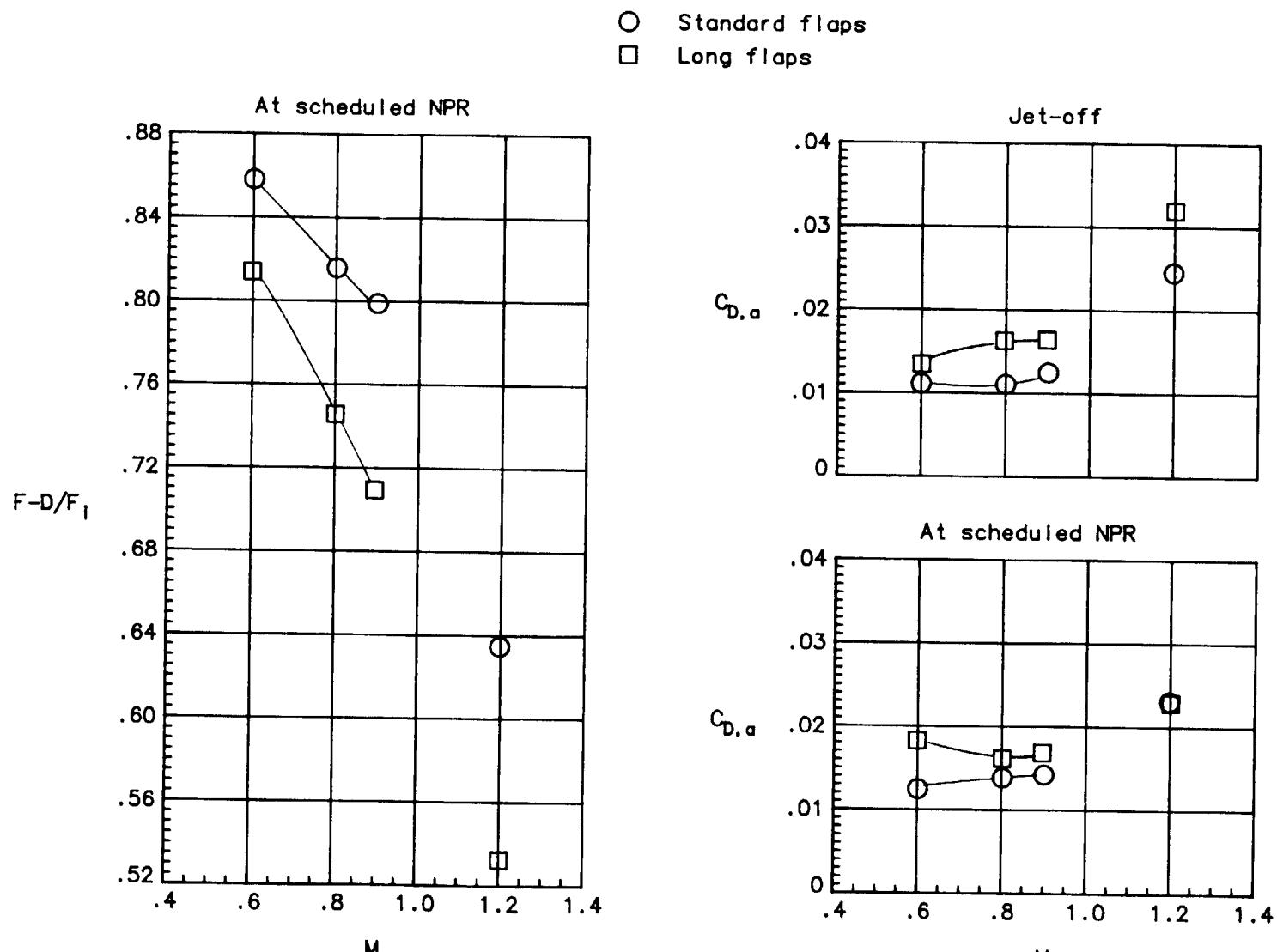
(b) $\delta_{v,p} = 20^\circ$.

Figure 48. Concluded.

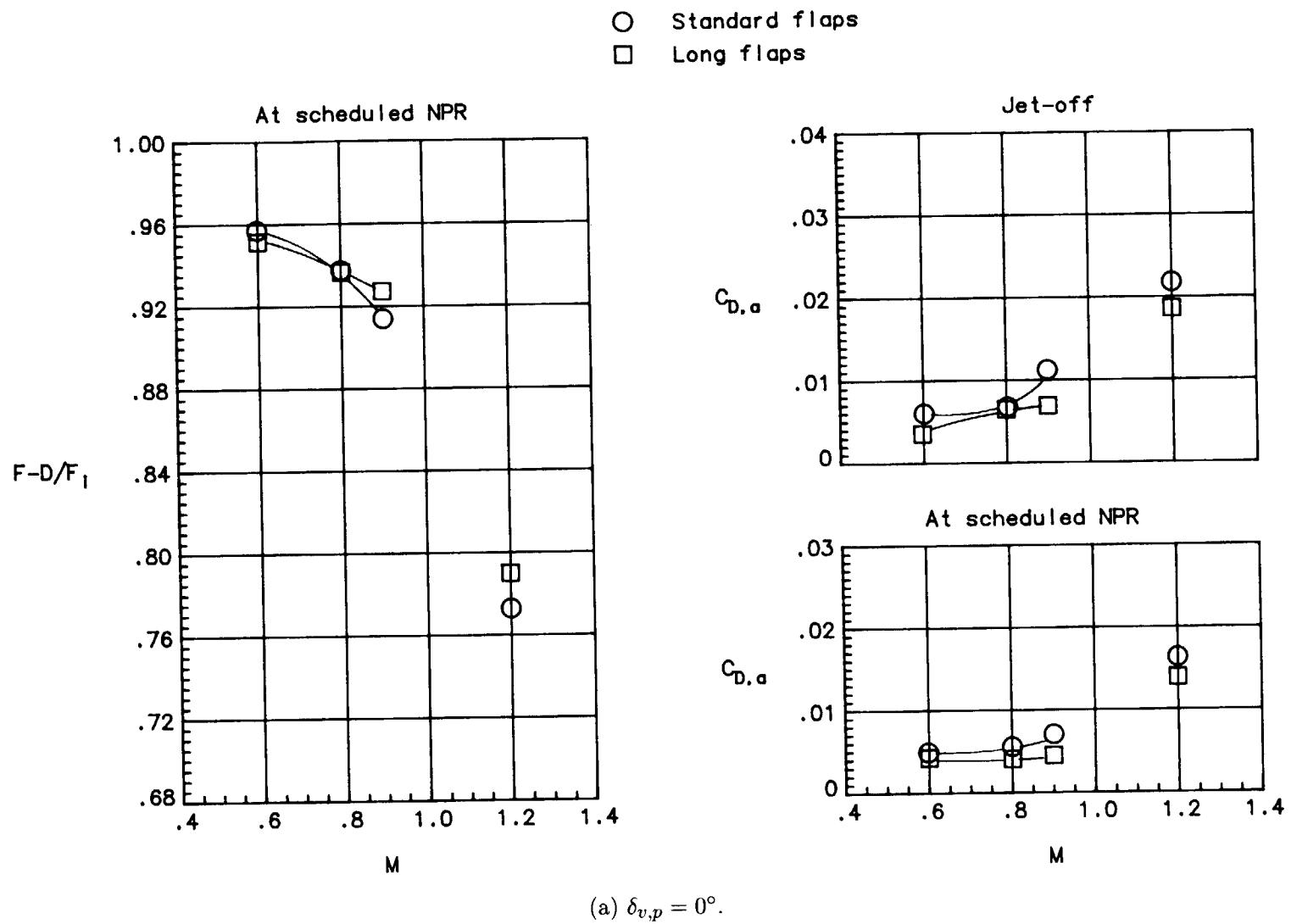


Figure 49. Summary of afterbody aeropropulsive performance with $\theta = 30^\circ$ and $\alpha = 0^\circ$.

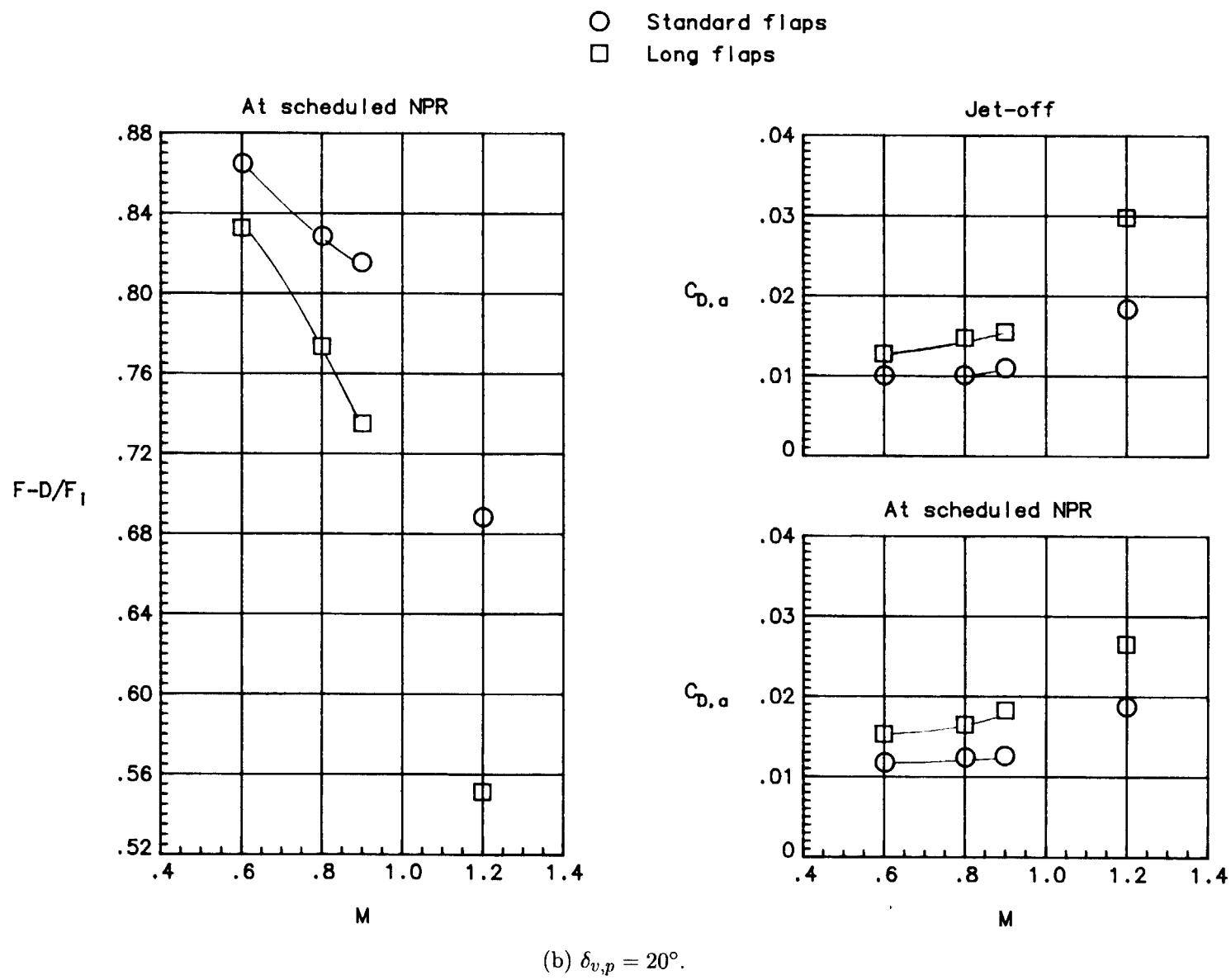
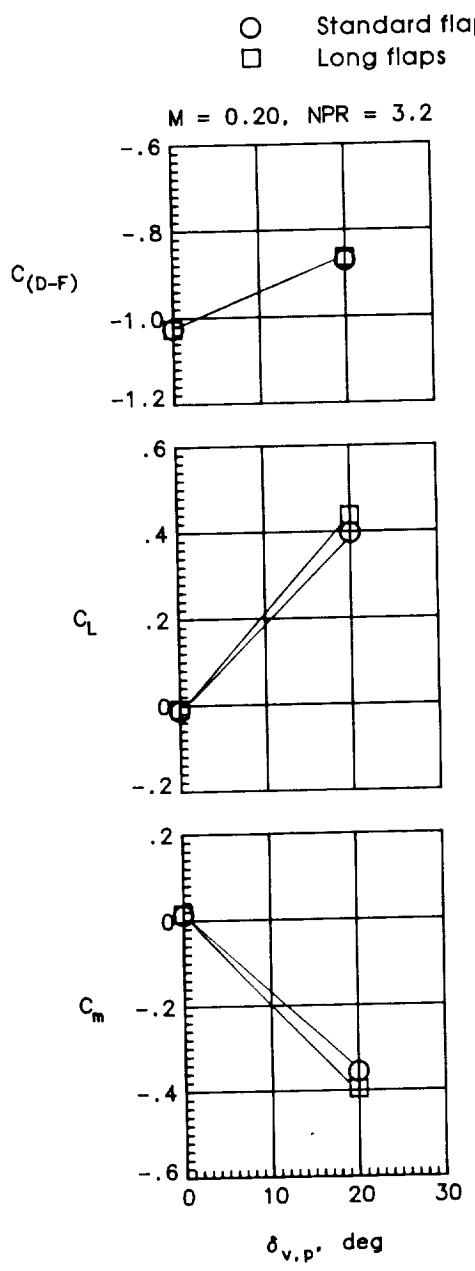


Figure 49. Concluded.



(a) $M = 0.20$.

Figure 50. Summary of total longitudinal aerodynamic characteristics with $\theta = 0^\circ$ and $\alpha = 0^\circ$.

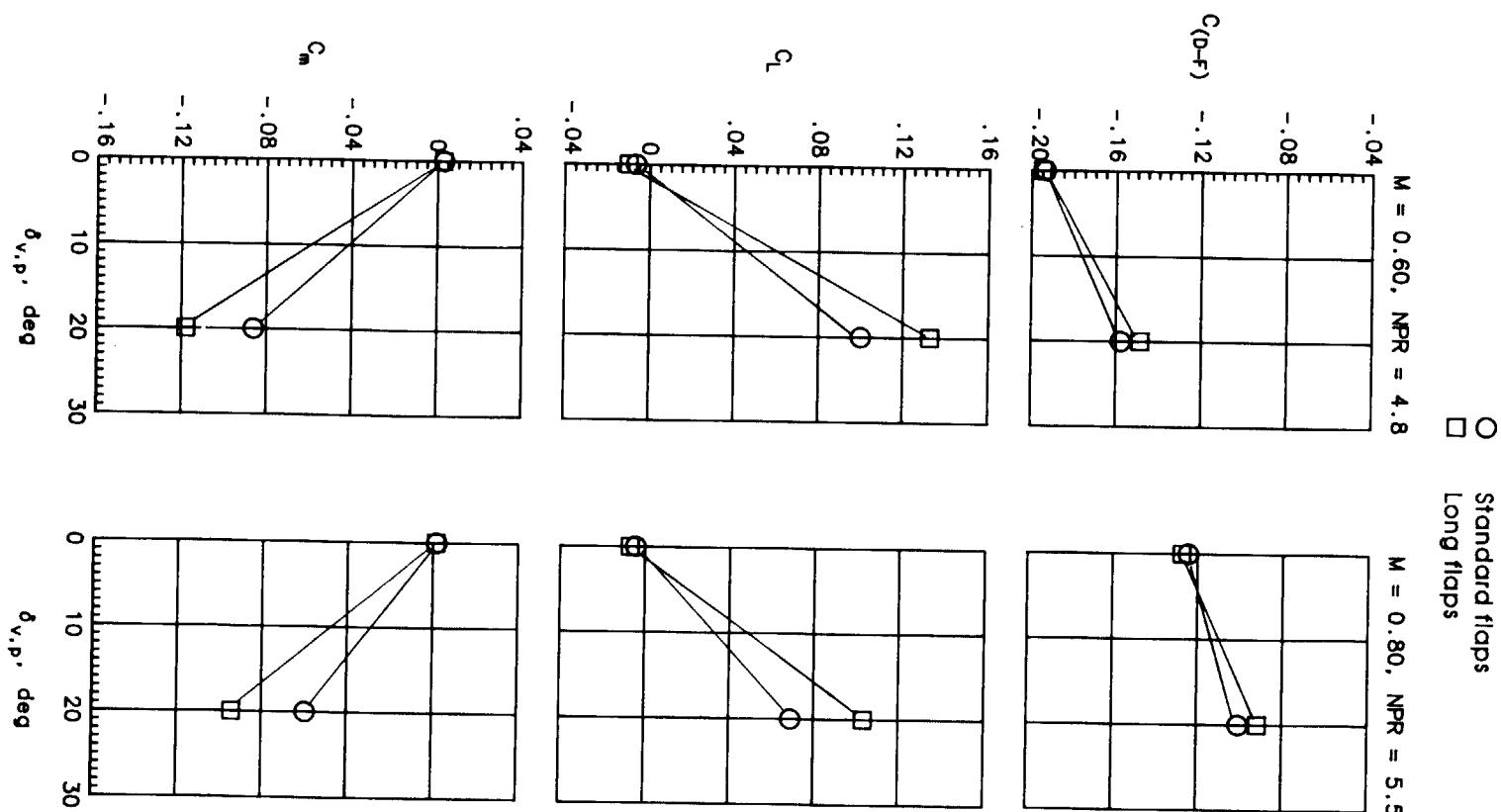
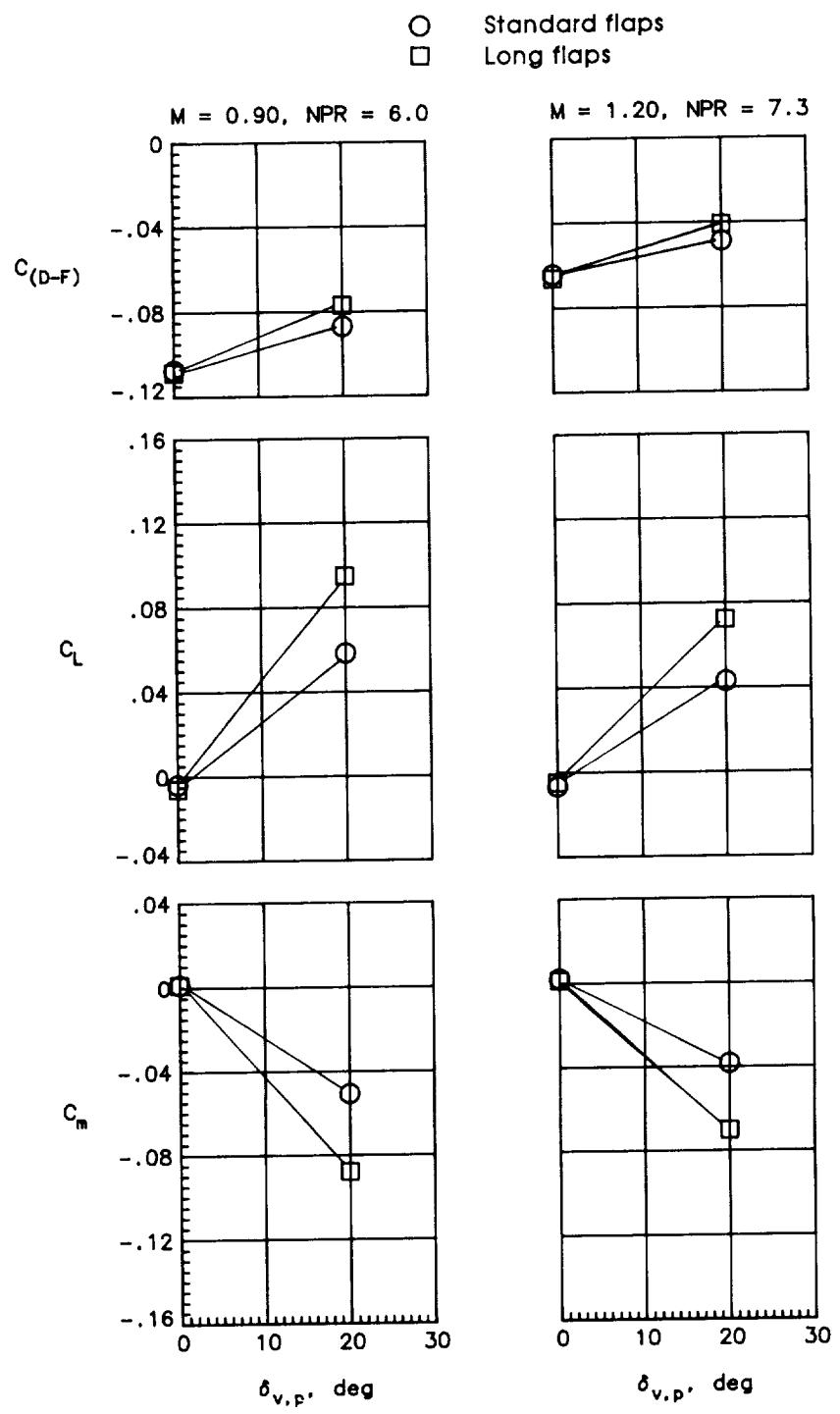
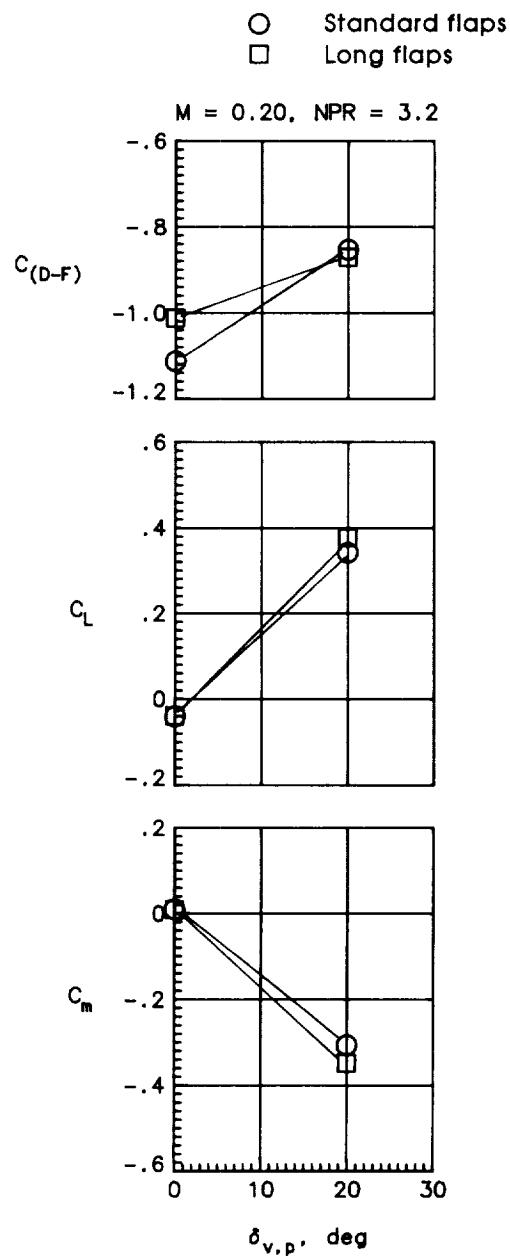
(b) $M = 0.60$ and 0.80 .

Figure 50. Continued.



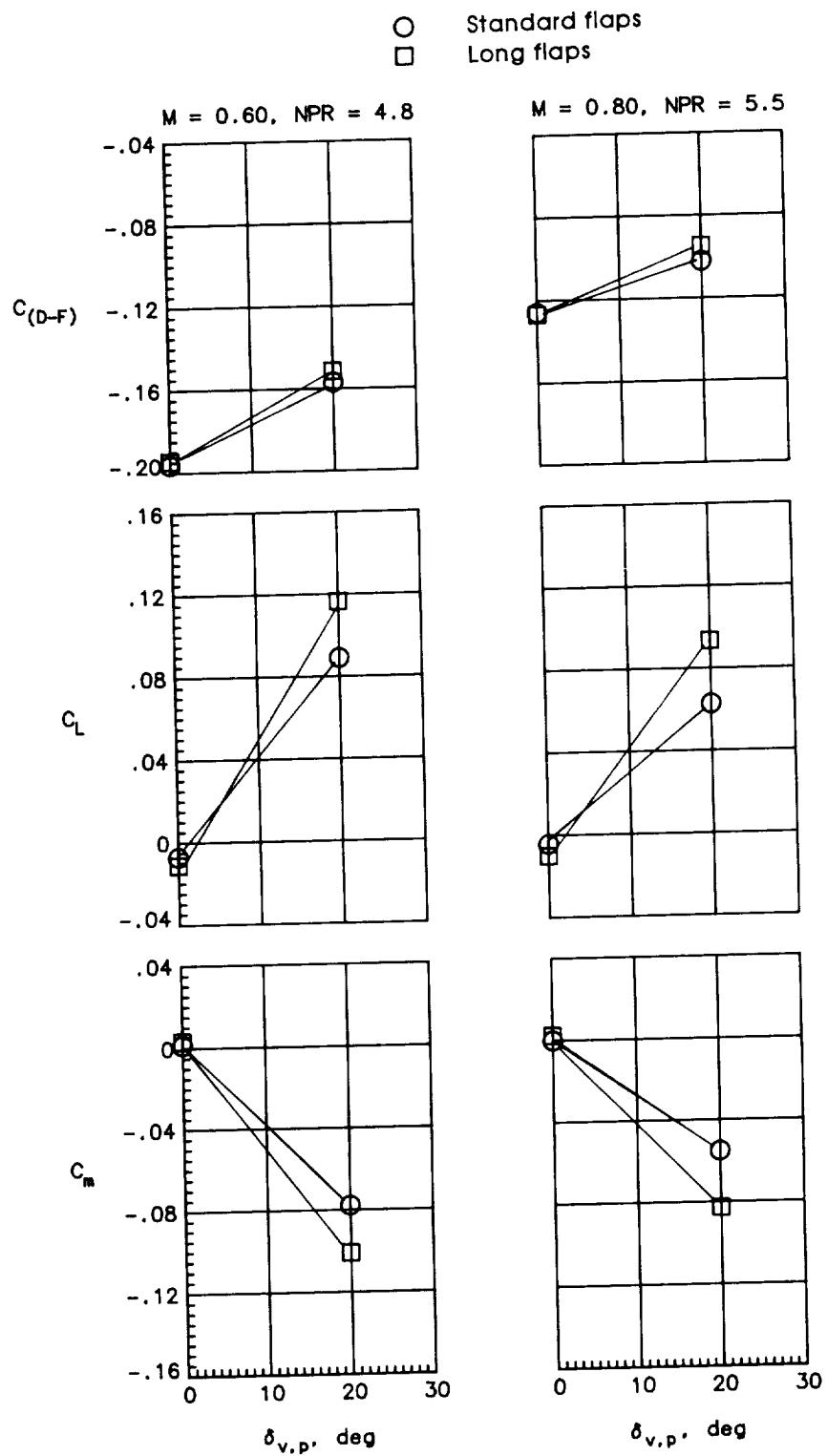
(c) $M = 0.90$ and 1.20 .

Figure 50. Concluded.



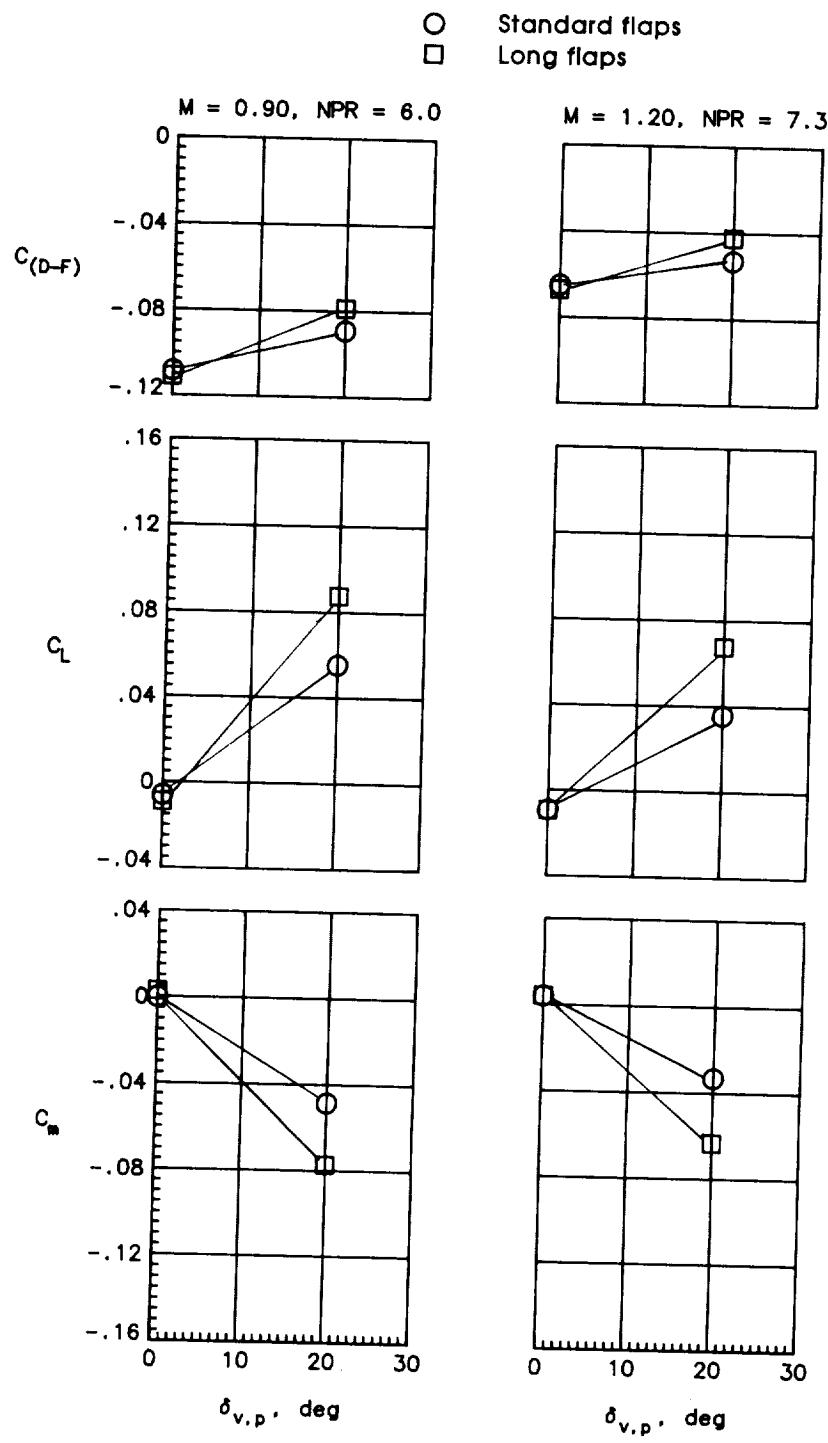
(a) $M = 0.20$.

Figure 51. Summary of total longitudinal aerodynamic characteristics with $\theta = 30^\circ$ and $\alpha = 0^\circ$.



(b) $M = 0.60$ and 0.80 .

Figure 51. Continued.



(c) $M = 0.90$ and 1.20 .

Figure 51. Concluded.

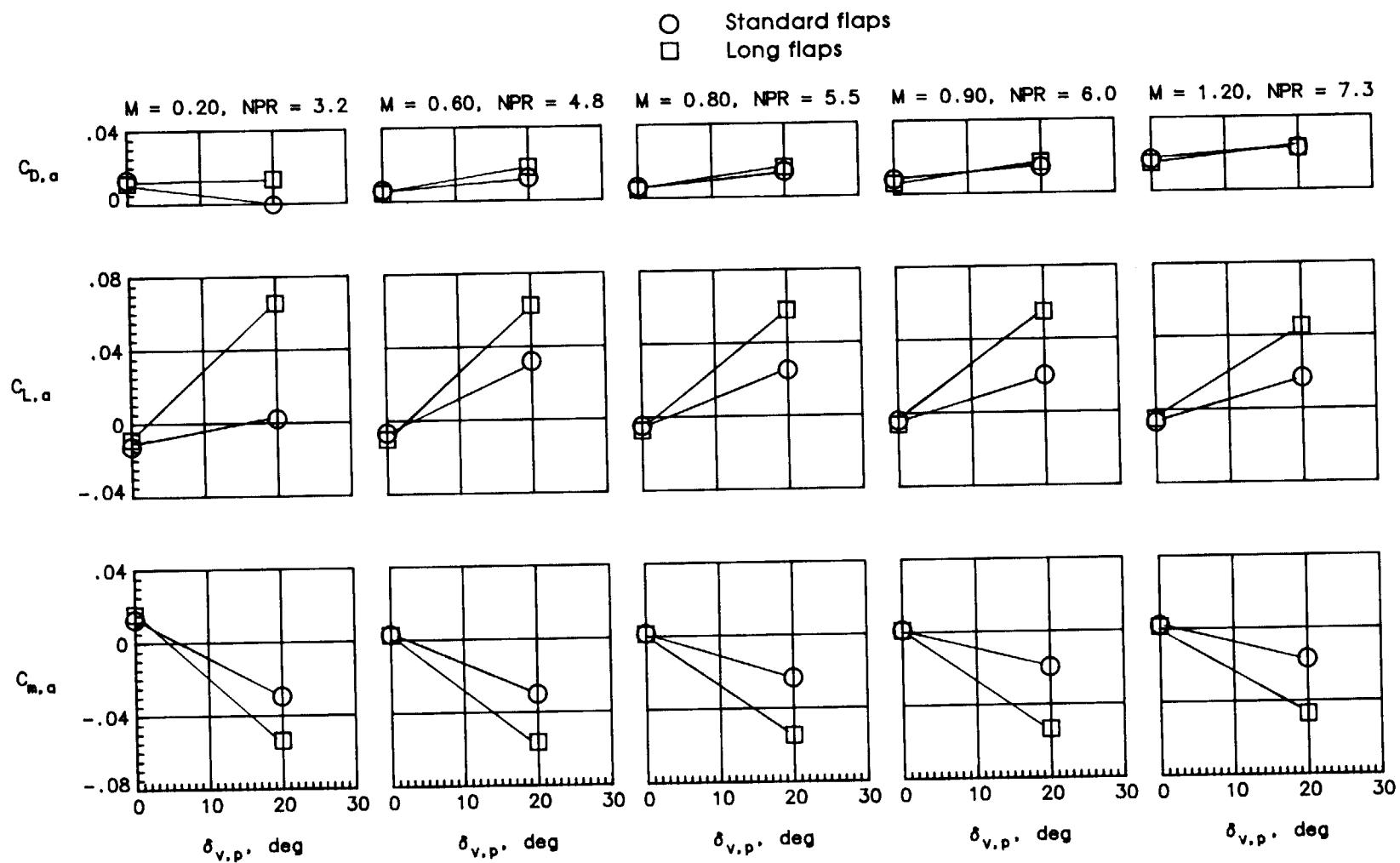


Figure 52. Comparison of induced longitudinal aerodynamic characteristics for standard and long flaps with $\theta = 0^\circ$ and $\alpha = 0^\circ$.

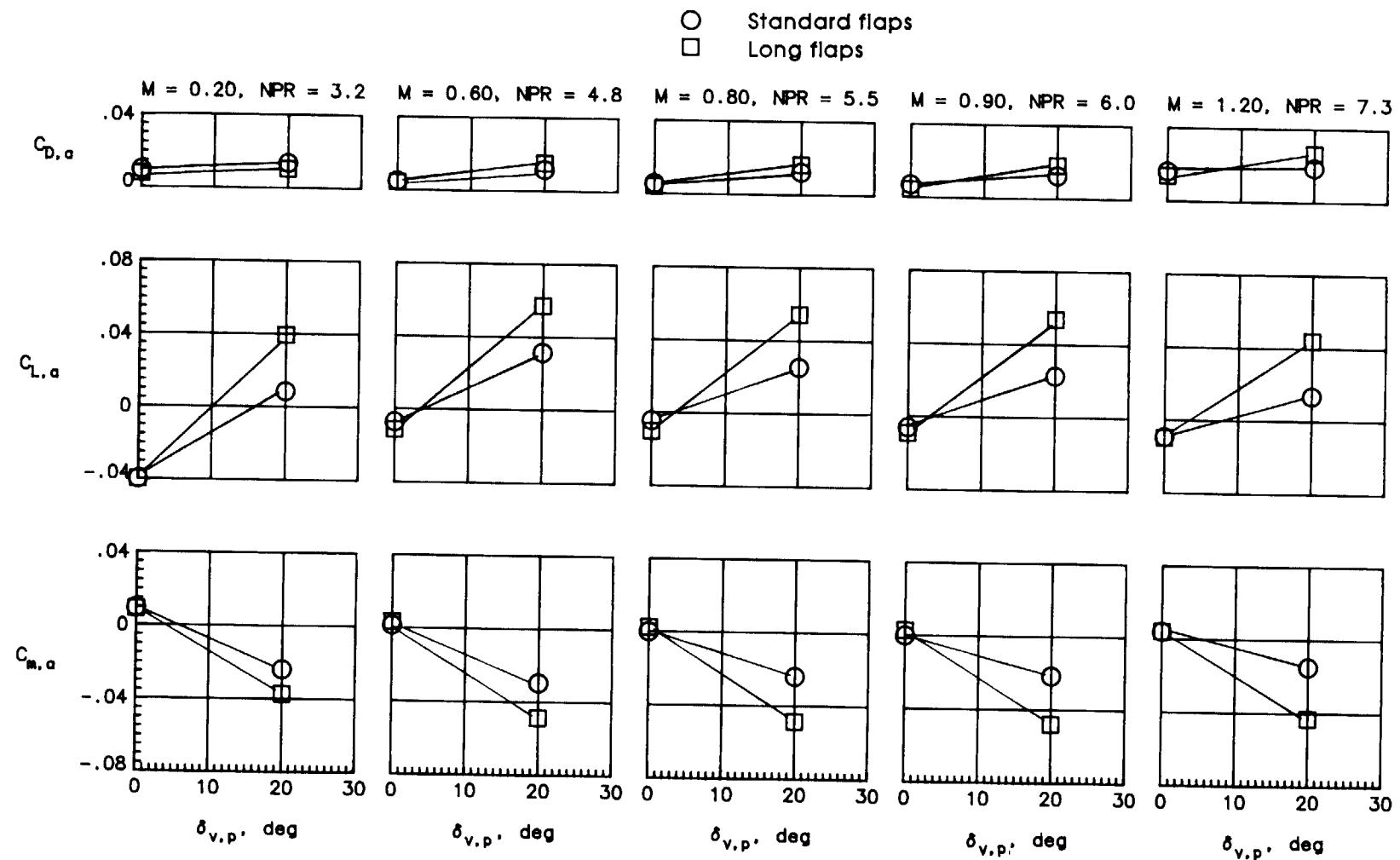
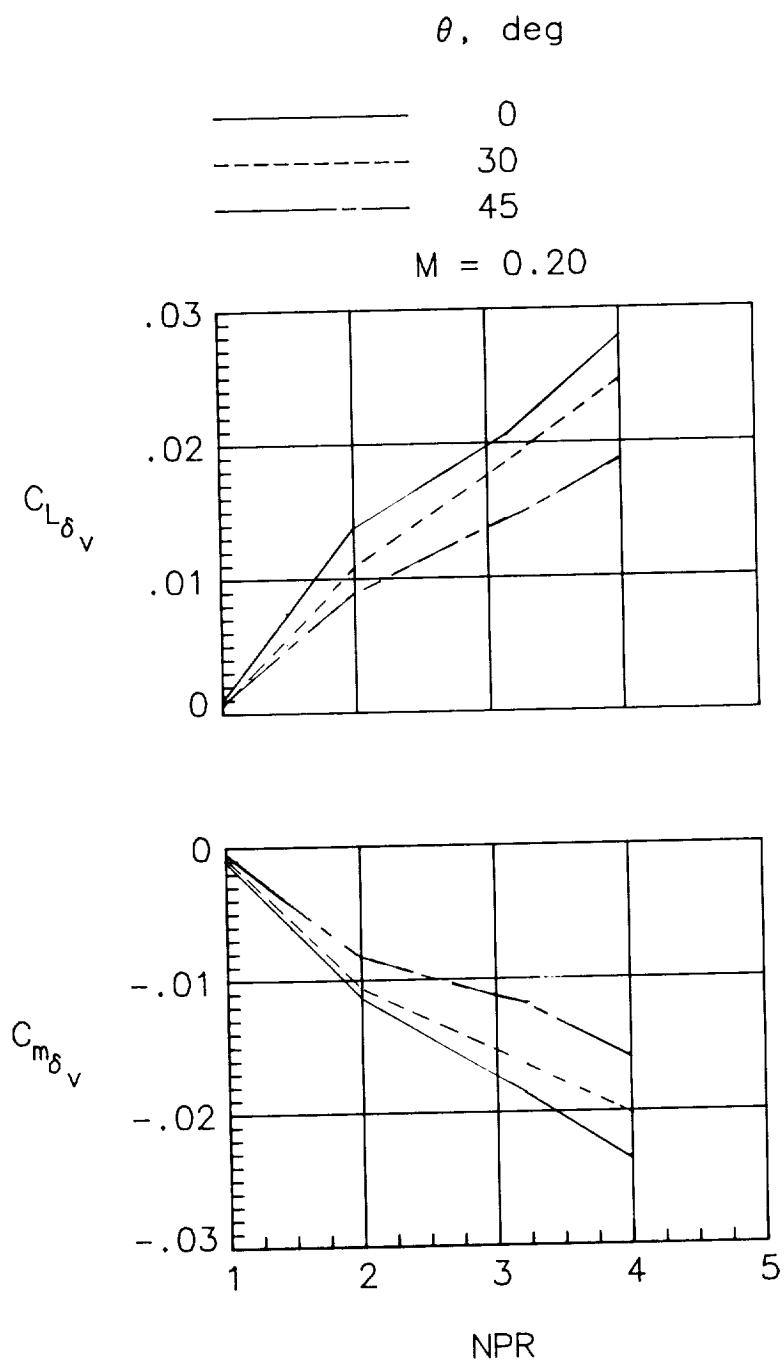
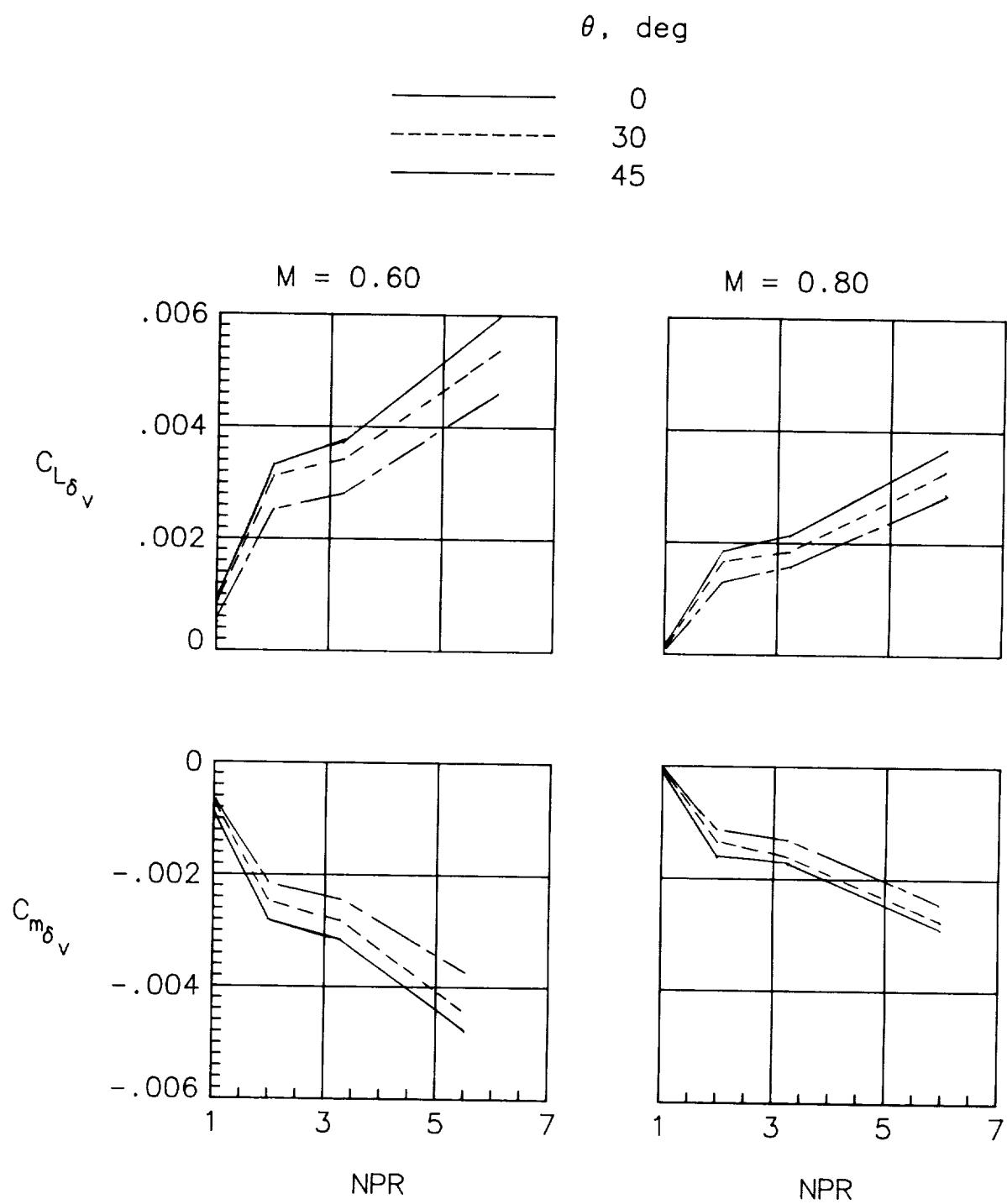


Figure 53. Comparison of induced longitudinal aerodynamic characteristics for standard and long flaps with $\theta = 30^\circ$ and $\alpha = 0^\circ$.



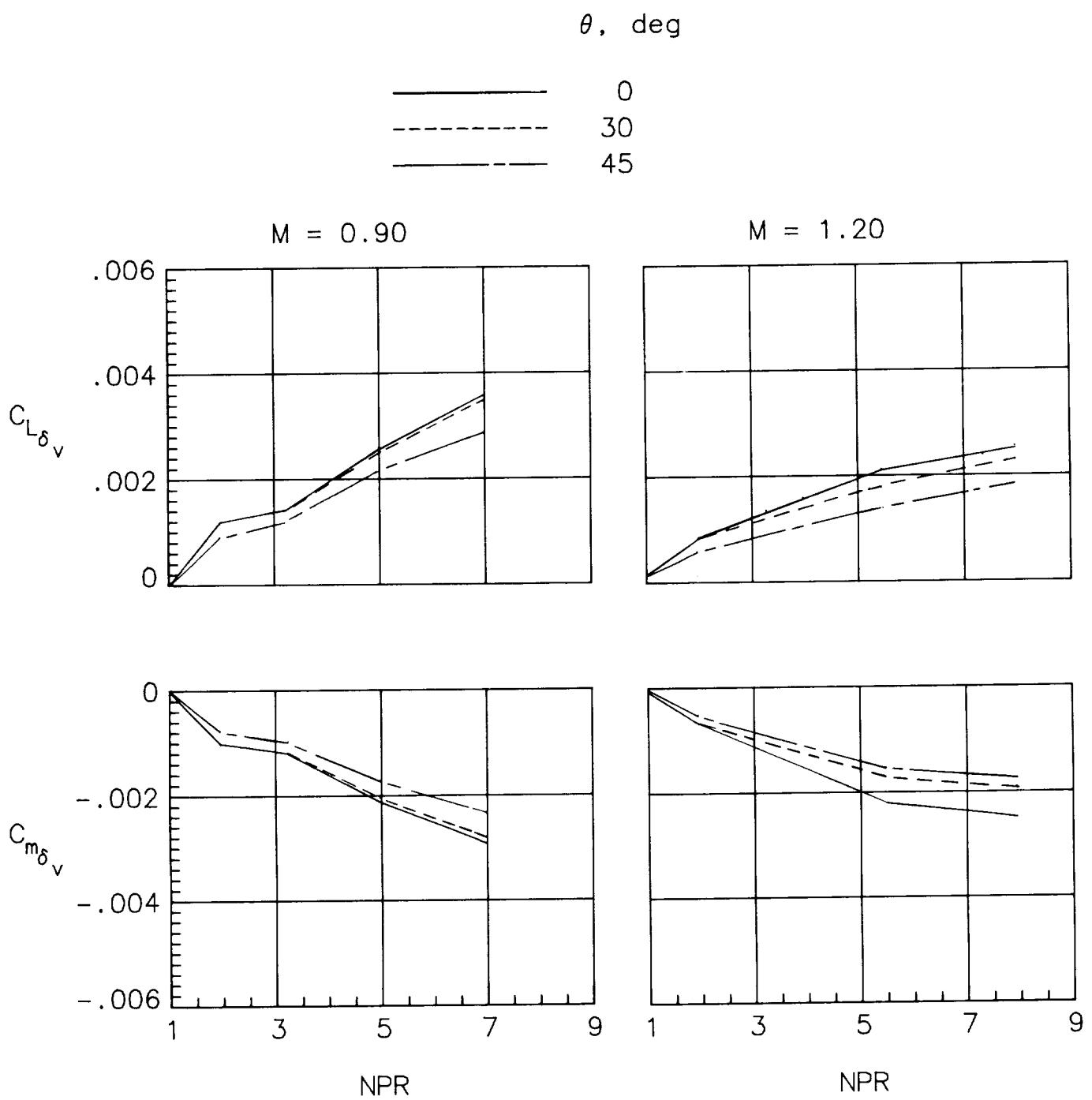
(a) $M = 0.20$.

Figure 54. Effect of nozzle pressure ratio on lift effectiveness and longitudinal control power for $\alpha = 0^\circ$.
Evaluated between $\delta_{v,p} = 20^\circ$ and 0° .



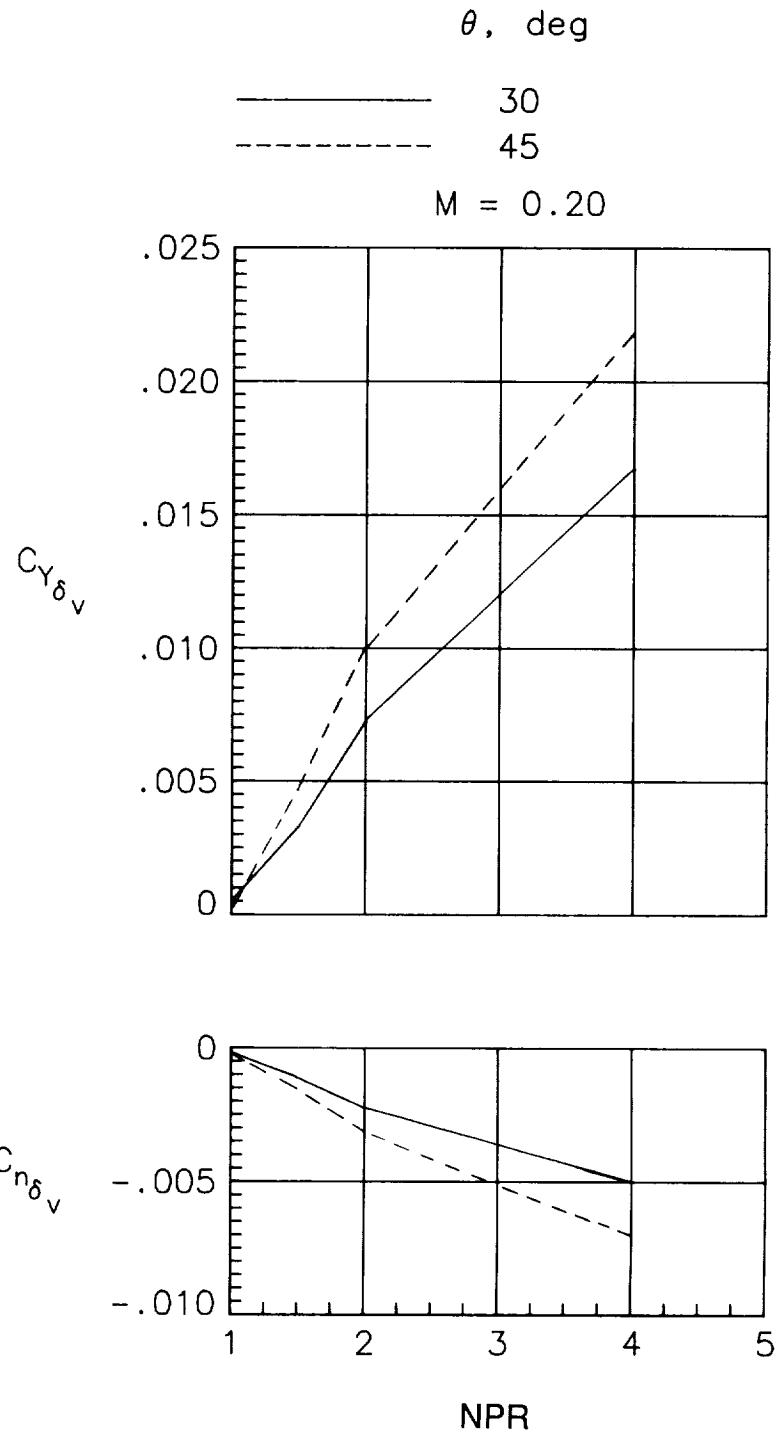
(b) $M = 0.60$ and 0.80 .

Figure 54. Continued.



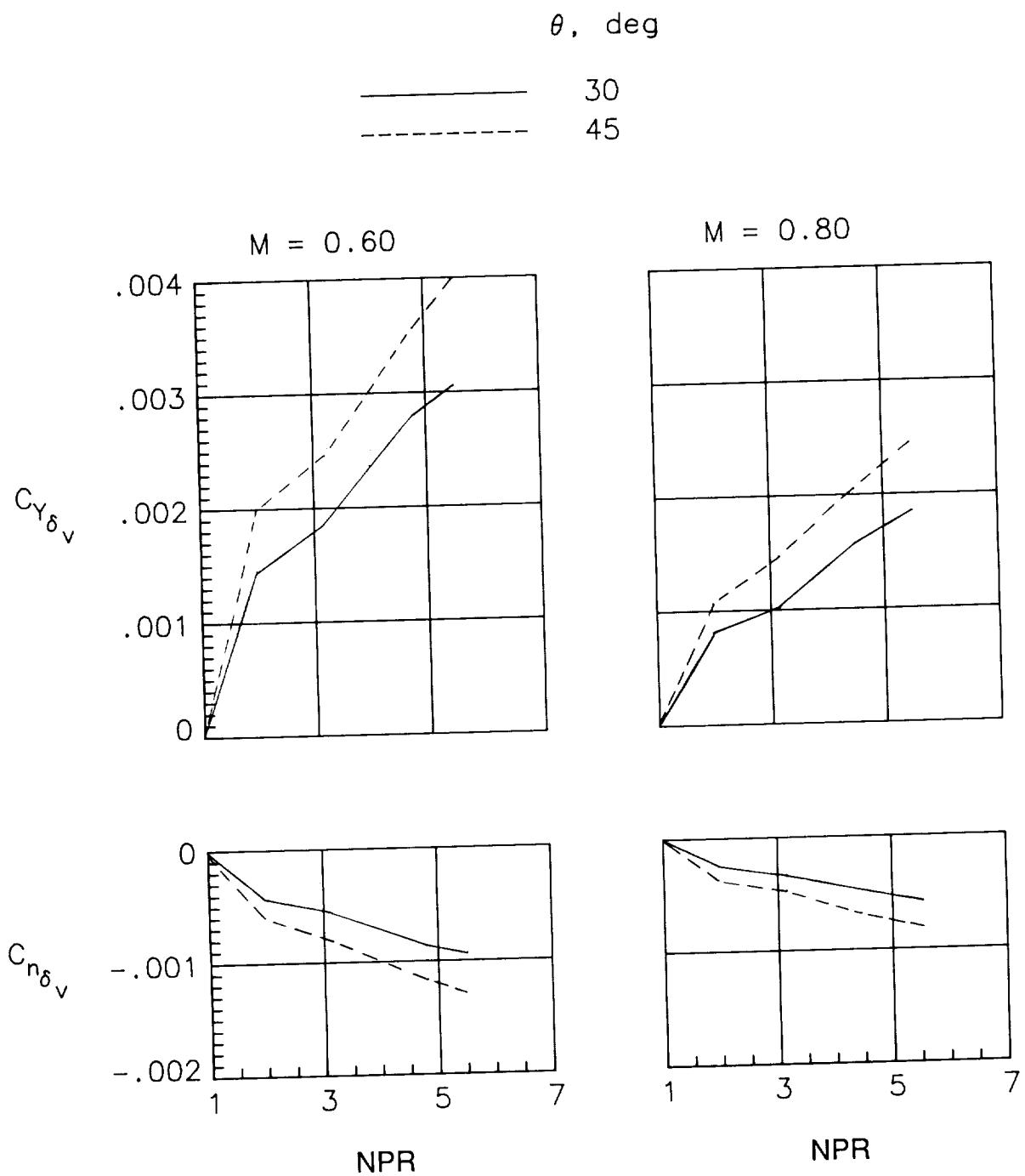
(c) $M = 0.90$ and 1.20 .

Figure 54. Concluded.



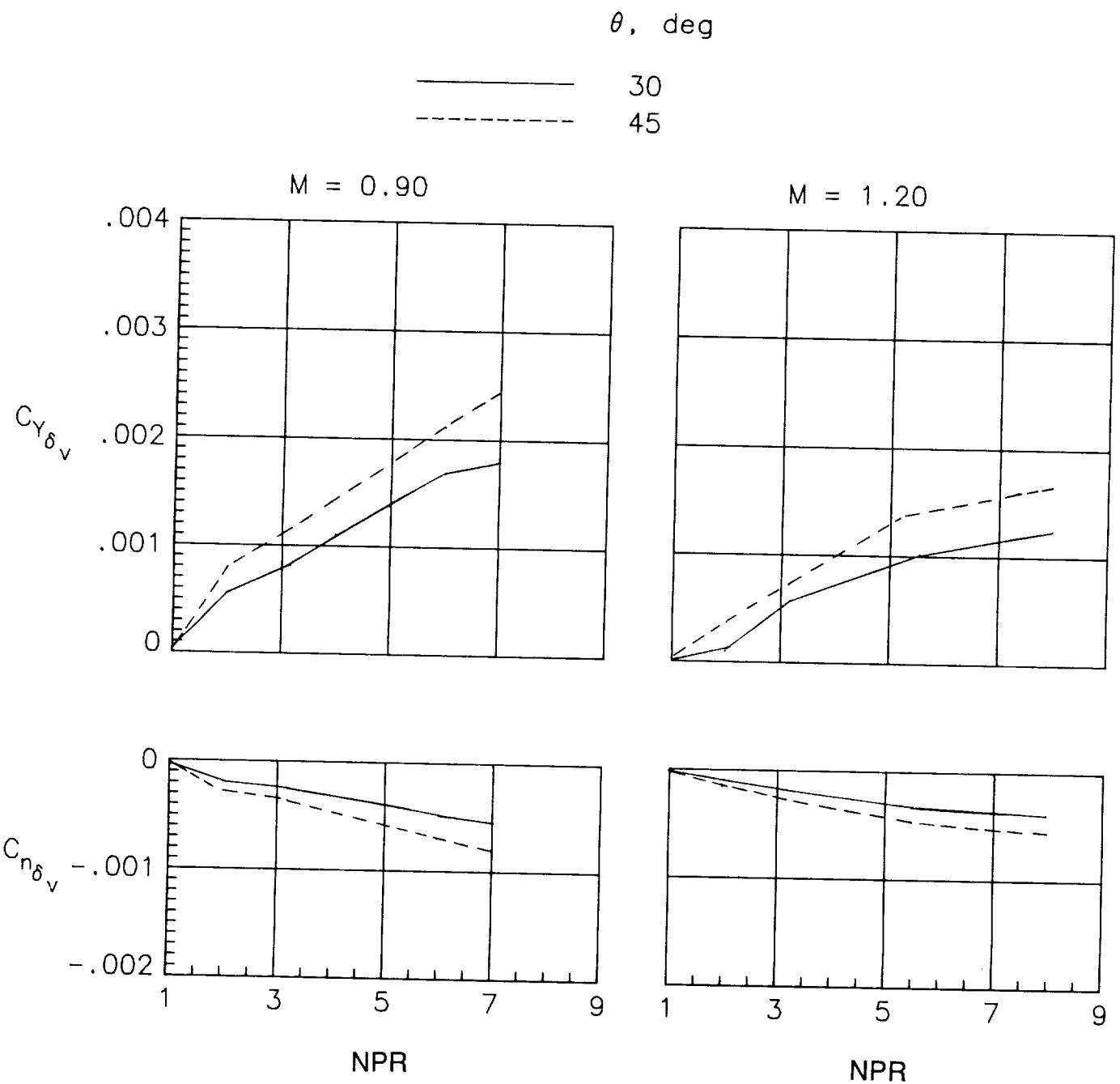
(a) $M = 0.20$.

Figure 55. Effect of nozzle pressure ratio on side-force effectiveness and directional control power with $\alpha = 0^\circ$.
Evaluated between $\delta_{v,p} = 20^\circ$ and 0° .



(b) $M = 0.60$ and 0.80 .

Figure 55. Continued.



(c) $M = 0.90$ and 1.20 .

Figure 55. Concluded.

Configuration	Control effector	Investigation
○ $\theta = 0^\circ$	Pitch vectoring	Current
□ $\theta = 30^\circ$		Current
◇ $\theta = 45^\circ$		Current
△ Transonic fighter		Ref. 11
▽ Supersonic fighter		Ref. 13
— Transonic fighter	Horizontal tail	Ref. 11
- - - Supersonic fighter	Canard	Ref. 13
--- F-15 Aircraft	Horizontal tail	Ref. 6

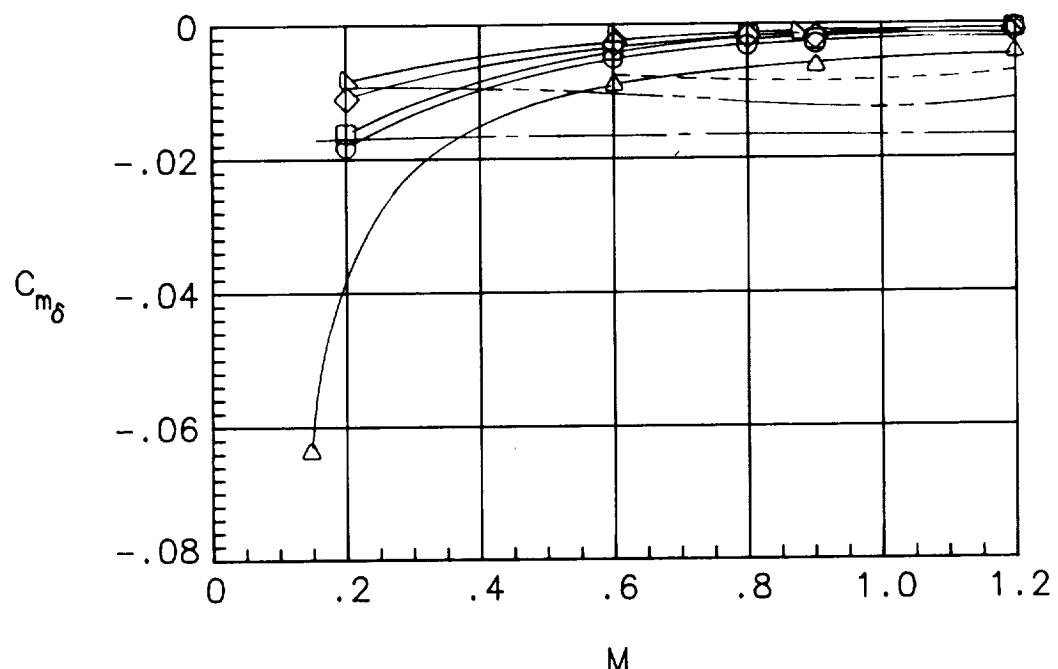


Figure 56. Comparison of longitudinal control power from powered and aerodynamic control effectors for $\alpha = 0^\circ$.

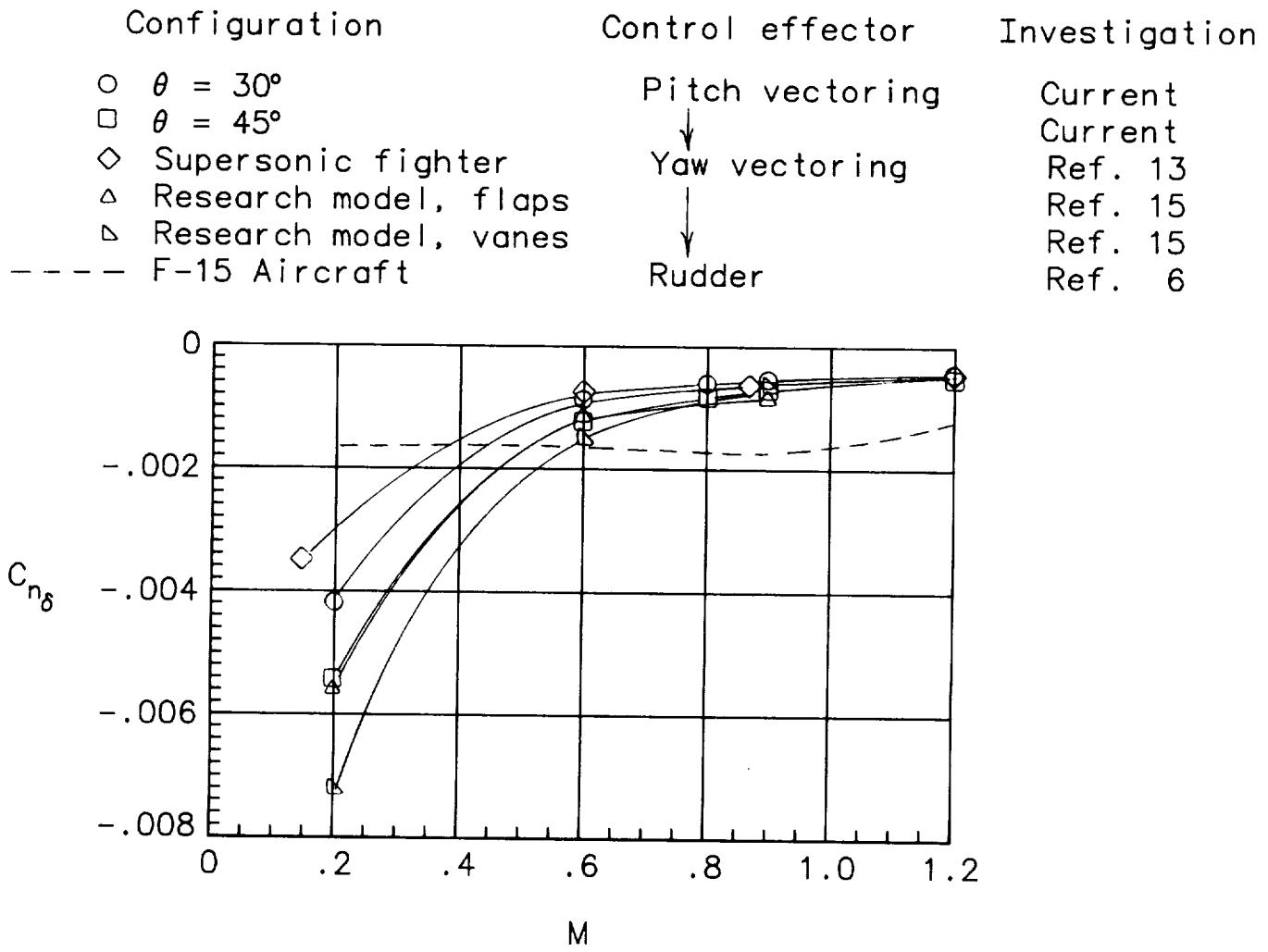
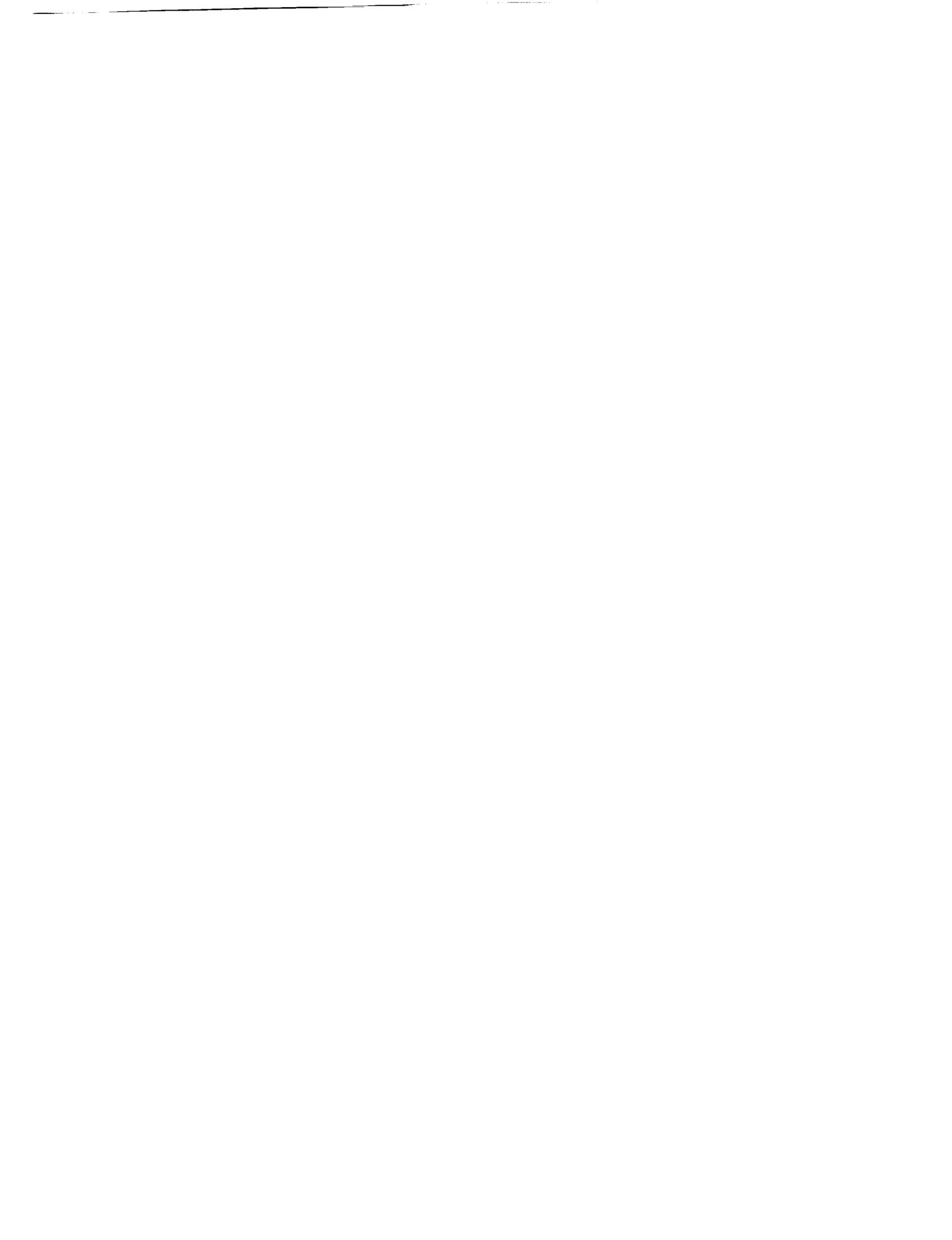


Figure 57. Comparison of directional control power from powered and aerodynamic control effectors for $\alpha = 0^\circ$.





Report Documentation Page

1. Report No. NASA TP-3060	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle Aeropropulsive Characteristics of Canted Twin Pitch-Vectoring Nozzles at Mach 0.20 to 1.20		5. Report Date May 1991	
7. Author(s) Francis J. Capone, Mary L. Mason, and George T. Carson, Jr.		6. Performing Organization Code	
9. Performing Organization Name and Address NASA Langley Research Center Hampton, VA 23665-5225		8. Performing Organization Report No. L-16823	
		10. Work Unit No. 505-62-71-01	
		11. Contract or Grant No.	
12. Sponsoring Agency Name and Address National Aeronautics and Space Administration Washington, DC 20546-0001		13. Type of Report and Period Covered Technical Paper	
		14. Sponsoring Agency Code	
15. Supplementary Notes			
16. Abstract The multiaxis thrust-vectoring capability obtained by canting two-dimensional convergent-divergent exhaust nozzles installed on a twin-jet afterbody model has been determined in an investigation conducted in the Langley 16-Foot Transonic Tunnel. Pitch vectoring was accomplished by deflection of the nozzle upper and lower divergent flaps. Several combinations of symmetric and differential pitch-deflection angles were tested at nozzle cant angles of 0°, 30°, and 45°. The effect of varying nozzle divergent flap length was also studied. This investigation was conducted at Mach numbers from 0.20 to 1.20, at angles of attack from 0° to 27.5°, at nozzle pressure ratios up to 8.0, and at sideslip angles of 0° and 5°.			
17. Key Words (Suggested by Author(s)) Twin engine Canted nozzles Thrust vectoring Powered controls		18. Distribution Statement Unclassified—Unlimited	
Subject Category 02			
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 255	22. Price A12



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